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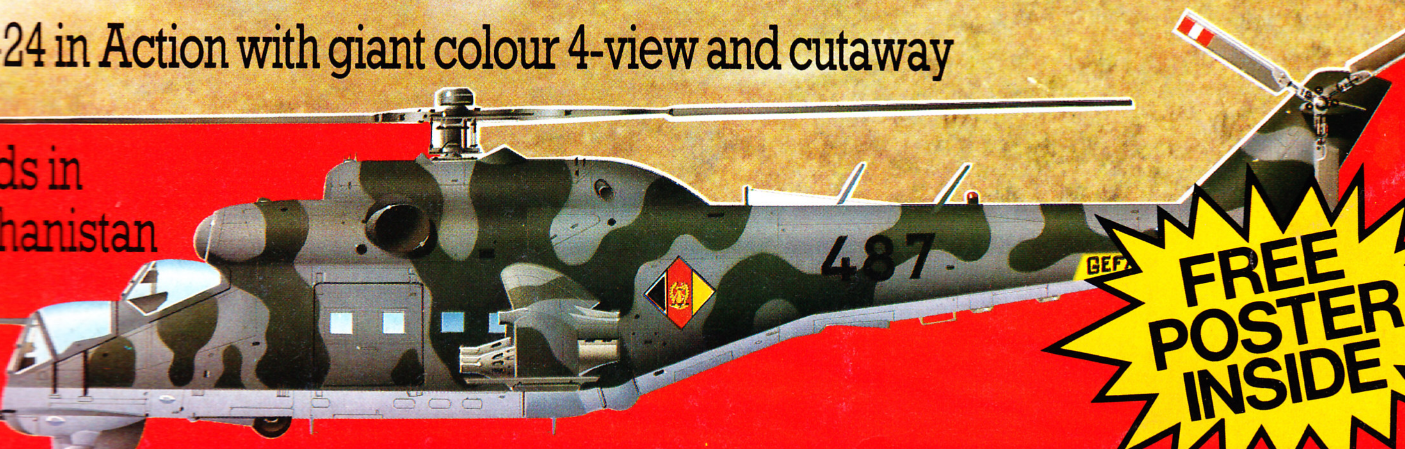

FREE POSTER INSIDE

A fully illustrated guide to the World's Armed Combat Helicopters

WAR MACHINE

Volume 1 **Issue 3**

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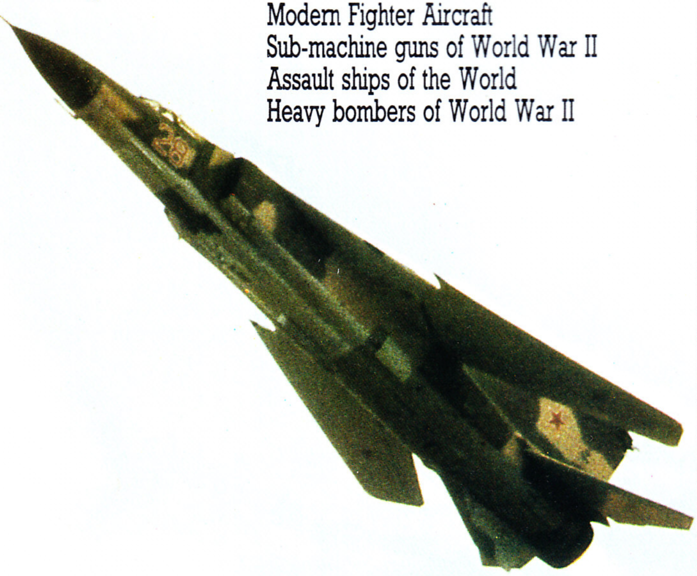

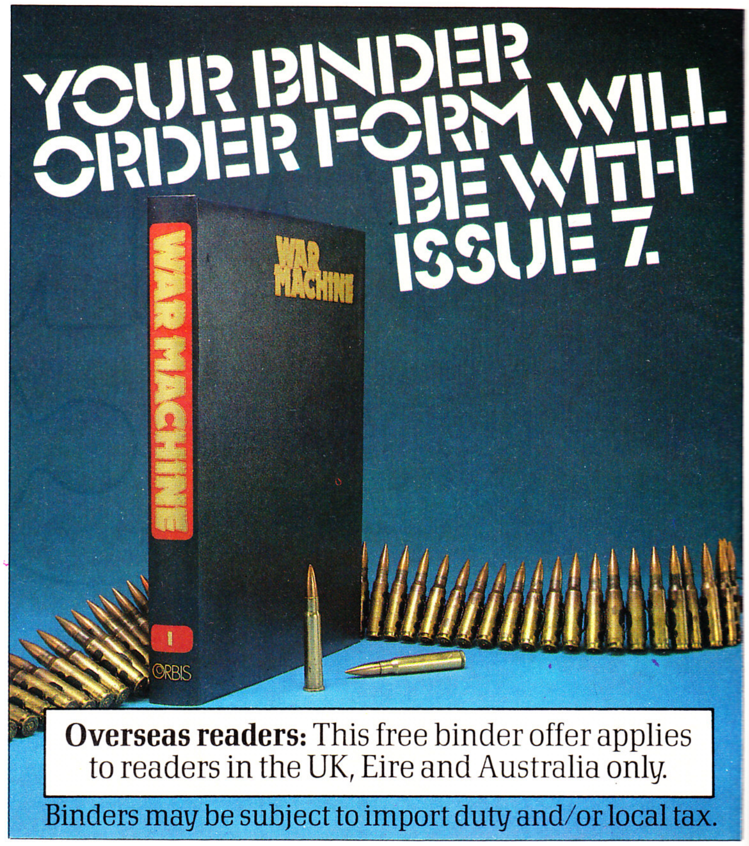

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Published by
Orbis Publishing Ltd

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Editorial Offices
War Machine
Aerospace Publishing Ltd
10 Barley Mow Passage
London W4 4PH

Managing Editor: Stan Morse
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Design: Rod Teasdale
Colour Origination: Imago Publishing Ltd, Thame, Oxon
Typesetting: SX Composing Ltd
Film work: Precise Litho Ltd

Artists:
Keith Fretwell
Gordon Beckett

15839

Printed in Great Britain by The Artisan Press Ltd

Distribution and marketing offices:
Orbis Publishing Ltd
Orbis House
20-22 Bedfordbury
London WC2N 4BT
Telephone: 01-379 6711
Circulation Director: David Breed
Marketing Director: Michael Joyce

WAR MACHINE
Price UK 80p. IR £1. Aus $1.95. NZ $2.25. SA R1.95. Singapore $4.50. USA and Canada $1.95
How to obtain your copies of WAR MACHINE: Copies are obtainable by placing a regular order at your Newsagent, or by taking out a subscription.
Subscription Rates
For six months (26 issues) £23.80; for one year (52 issues) £47.60. Send your order and remittance to Punch Subscription Services, Watling Street, Bletchley, Milton Keynes, Bucks MK2 2BW, being sure to state the number of the first issue required.
Back Numbers
UK & Eire: Back numbers are obtainable from your Newsagent or from WAR MACHINE Back Numbers, Orbis Publishing Limited, 20-22 Bedfordbury, London WC2N 4BT at cover price.
Australia: Back numbers are obtainable from WAR MACHINE Back Numbers, Gordon & Gotch (Aus) Ltd, 114 William Street, PO Box 767G, Melbourne, Vic 3001.
South Africa, Europe, Malta and New Zealand: Back numbers are available at cover price from your Newsagent. In case of difficulty write to the address in your country given for binders. South African readers should add sales tax.
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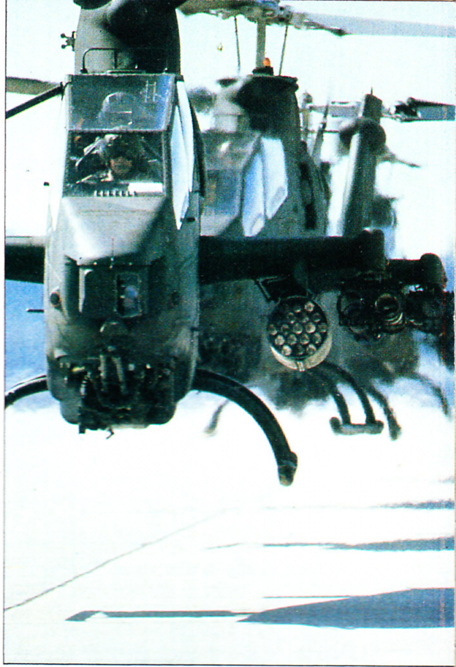
New Zealand: Binders are available through your local Newsagent or from WAR MACHINE Binders, Gordon & Gotch (NZ) Ltd, PO Box 1594, Wellington.
South Africa: Binders are available through any branch of Central News Agency. In case of difficulty write to WAR MACHINE Binders, Intermag, PO Box 57394, Springfield 2137.

Note: Binders and Back Numbers are obtainable subject to availability of stocks. Whilst every attempt is made to keep the price of the issues and binders constant, the publishers reserve the right to increase the stated prices at any time when circumstances dictate. Binders depicted in this publication are those produced for the **UK market only** and may not necessarily be identical to binders produced for sale outside the UK. Binders and issues may be subject to import duty and /or local taxes, which are not included in the above prices unless stated.

The WAR MACHINE published by Orbis Publishing Ltd has no connection with the WAR MACHINE published by Emjay. The latter is a magazine devoted to computer simulation gaming and further information and subscription details can be obtained from Emjay, 17 Langbank Avenue, Rise Park, Nottingham NG5 5BU, England.

Armed Combat Helicopters

Since their battlefield debut in the Korean war, helicopters have come a long way. First used in large numbers by the French in Algeria and brought to full prominence during the Vietnam War, the armed helicopter now bristles with advanced optical and electronic equipment, carries a wide range of weaponry ranging from machine-guns to tank-busting guided weapons, and may be armoured to enhance battlefield survivability.



By far the most successful dedicated gunship helicopter yet built, the Bell AH-1 HueyCobra has developed into a major family with different engines, sensors, weapons and equipment. These are of the latest US Army model, the Production AH-1S.

For several fundamental reasons of aerodynamics, of structural stress and of fatigue of metal parts subjected to oscillating loads, helicopters took a very long time to develop to the point where they could do genuinely useful jobs. Even today the fundamental limitations still apply to a considerable degree, so that the best modern helicopters are much slower than equivalent aeroplanes and, in general, more vulnerable and subject to higher insurance premiums (which says something about the likelihood of severe damage). At the same time, helicopters offer a unique combination of agility and hovering efficiency which makes them the only vehicles of man's creation that can truly be said to fly, in the sense that birds or insects can fly. This has gradually opened up a growing range of applications in warfare for armed helicopters.

The first armed helicopters of the period immediately following World War II were used for simple experiments with machine-guns, air-to-surface rockets and anti-submarine weapons. Even with the best designs the payload was severely limited, so that it was impossible to carry much in the way of weapons and still have a worthwhile mission radius or endurance. The turning point was the switch to gas-turbine propulsion from the mid-1950s. At a stroke this slashed the helicopter's empty weight, greatly increased available power and dramatically improved safety and reliability. For the first time twin-engine safety was possible, failure of either engine of twin-engine helicopters resulting in only a slight reduction in flight performance.

Today continued improvement in turbine engines, in structural materials, in avionics and especially in newly devised design techniques have led to new breeds of helicopter which can fly reliably in all weathers, deal devastating blows against hostile armour or warships and yet remain either hidden or surprisingly immune to return fire. From being the most vulnerable aircraft in the sky, the armed helicopter has today become extremely difficult to shoot down.

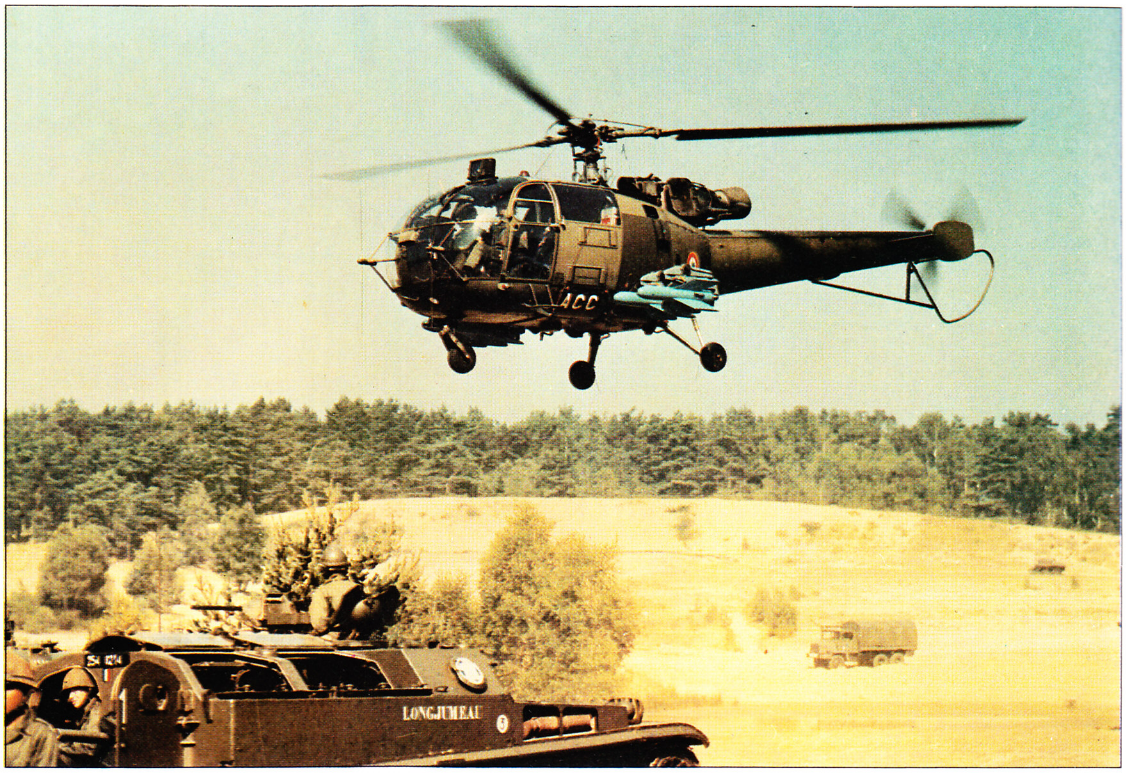
There are obvious advantages in being small and agile. Useful battlefield helicopters can be very elusive targets, none more so than the Hughes Defender which has a main rotor of only just over 26 ft (8 m) diameter. The latest Defenders are available with an MMS (mast-mounted sight) which enables the helicopter to engage tanks or other targets whilst still remaining hull-down behind natural cover.

Maritime helicopters range from compact types for use from small warships up to larger ASW machines with the flight crew separate from the mission crew in a tactical cabin with inputs from such sensors as sonobuoys, radar and MAD gear, with computers to manage the overall attack, which may be co-ordinated with friendly warships. Most naval helicopters must still be small enough to operate from ships other than carriers, and it is noteworthy that the newest large multi-role machine in this class, the Westland/Agusta EH 101, is the same size as a Sea King despite the fact it will be 50 per cent heavier and 50 per cent more powerful.

Designed to survive while undertaking the most arduous of battlefield tasks, the Hughes AH-64 is more sophisticated and more expensive than any other battlefield helicopter.

FRANCE

Aérospatiale Alouette III



Now being replaced by the SA 342M Gazelle with HOT missiles, the Alouette III is still widely used by the French army light aviation as an anti-tank machine.

The **Aérospatiale Alouette III** is in reality an enlarged and aerodynamically refined version of the Alouette II, using the same basic dynamic system with a more powerful engine to provide increased performance despite the greater payload. The prototype, designated **SE 3160**, first flew on 28 February 1959, and was followed by the initial production version, the **SA 316A Alouette III,** which remained available until the end of the 1960s. This version was chosen for licence-production in India under the designation **HAL Chetak** for general military purposes. From 1970s the standard model was the **SA 316B Alouette III,** which retained the 570-shp (525-kW) Turboméca Artouste IIIB turboshaft of its predecessor, but combined in this application with a strengthened transmission to permit greater weights. The SA 316A had proved moderately popular with military air arms, but the SA 316B was immensely popular for its increased payload, greater reliability and excellent high-altitude performance. This last the SA 316B had inherited from the SA 316A, which had set several helicopter records for altitude and payload-to-altitude. Small numbers of the **SA 316C Alouette III** were also built, this version having the Artouste IIID turboshaft. The enlarged cabin of the Alouette III series can accommodate a pilot and up to six passengers, or a slung load of 750 kg (1,653 lb) can be carried as an alternative. In military service, however, the Alouette III is used mostly as a two-seat light attack helicopter, with a variety of guns, rocket pods and missiles carried externally on the sides of the cabin for close support and anti-tank operations.

In 1967 there flew the prototype **SA 319B Alouette III Astazou** derived from the SA 316B but using the considerably more efficient Astazou XIV for greater performance combined with a fuel burn reduced by some 25 per cent. This model entered production in 1973, and immediately proved the most successful variant of the series, offering military operators improved attack capability (thanks to the type's ability to lift more weapons, or to carry the same weapons load as the SA 316 series at higher performance) and greater economy. Though more modern types have generally replaced the Alouette III as a front-line helicopter in the world's more advanced air arms, the type still plays a significant part in the inventories of many smaller air arms.

Specification

Aérospatiale SA 319B Alouette III Astazou

Type: general-purpose military helicopter

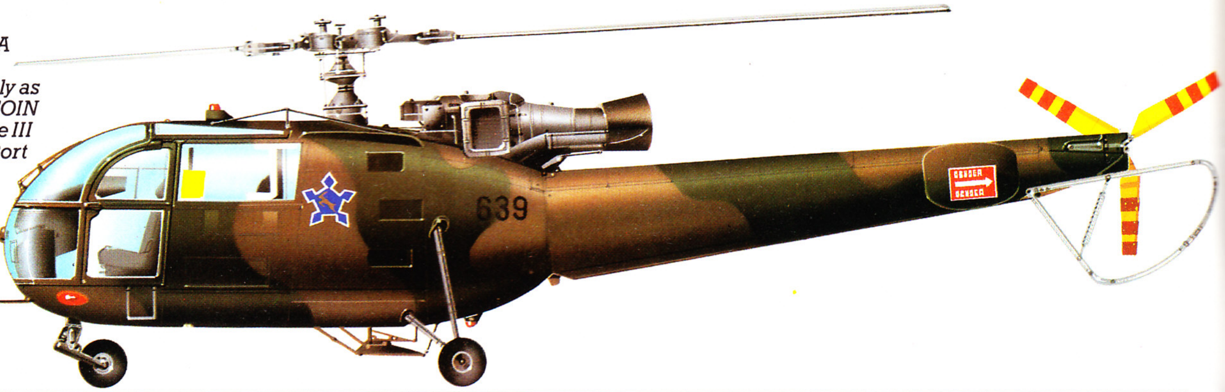
Powerplant: one 870-shp (649-kW) Turboméca Astazou XIV turboshaft derated to 600 shp (448 kW)

Armament: a wide assortment of weapons can be carried, these including a 20-mm cannon, various types of machine-gun, rocket pods and AS.11 or AS.12 air-to-surface missiles

Performance: maximum speed 220 km/h (136 mph) at sea level; range 605 km (375 miles) with maximum internal load

Weights: empty 1146 kg (2,527 lb); maximum take-off 2250 kg (4,960 lb)

Dimensions: main rotor diameter 11.02 m (36 ft 1¾ in); fuselage length 10.03 m (32 ft 10¾ in); height 3.00 m (9 ft 10 in); main rotor disc area 95.38 m^2 (1,026.5 sq ft)



One of the 52 foreign military customers for the Aérospatiale SA 316C Alouette III is South Africa, which uses at least 40 and possibly as many as 70 for training, liaison, COIN assault and utility duties. Alouette III units are at Durban, Ysterplaat, Port Elizabeth, Bloemspruit and Zwartkop.

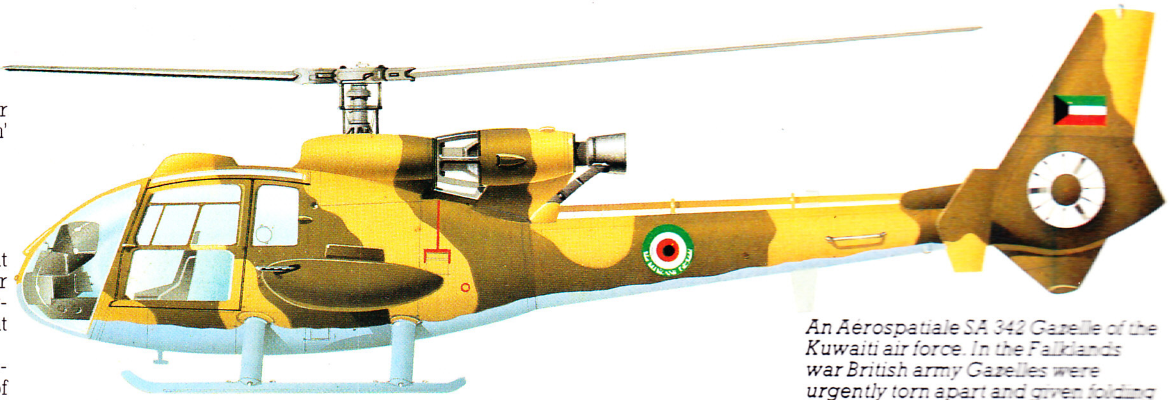
FRANCE/UK

Aérospatiale Gazelle

Though distantly derived from the Alouette, the Aérospatiale **Gazelle** was designed as a more capable military and civil helicopter embodying an advanced rotor system (including a *fenestron* anti-torque rotor buried in a low-drag installation within the fin) and streamlined contours to improve performance. This means that in comparison with the Alouette, the Gazelle differs in having a completely streamlined stressed-skin fuselage and cabin for side-by-side pilots with dual controls. The first prototype flew on 7 April 1967, and the first production SA 341 flew on 6 August 1971, and featured the Bölkow-developed rigid main rotor and Aérospatiale *fenestron* shrouded tail rotor in a duct built into the fin. As part of the 1967 agreement with the UK many early Gazelles were assembled and partly built by Westland for the British army (**Gazelle AH.Mk 1**), RN (**Gazelle HT.Mk 2**) and RAF (**Gazelle HT.Mk 3**). The Gazelle AH.Mk 1 has Doppler, auto-chart display and (optionally) TOW missiles and roof sight; the HT variants have a stability-augmentation system, the naval Gazelle HT.2 also having a rescue hoist. Powerplant of the Gazelle AH.Mk 1 is the 600-shp (448-kW) Astazou IIIN turboshaft. The **SAL 341F** is the basic ALAT (French Army light aviation) model, with the Astazou IIIC turboshaft and intended for utility purposes. The **SA 341H** military export version is powered by the Astazou IIIB turboshaft and licence-built by Soko of Yugoslavia. The **SA 342** introduced an Astazou engine uprated from 590 to 859 shp (440 to 641 kW) and an improved *fenestron* permitting weight to be increased, and resulted from a Kuwaiti requirement. Of several military SA 342 versions, ALAT is buying 120 of the **SA 342M** model with advanced avionics and four HOT missile tubes with a stabilized sight on the roof, this type providing the French army with very effective anti-tank defence. Total sales of all versions reached 1,000 by 1983, including deliveries to 14 military customers worldwide. The type has also been produced for the civil market in **SA 341G** and **SA 342J** forms. The SA 342 variants generally have slightly better overall performance than the

SA 341 models, but have greater payload and superior 'hot-and-high' capabilities.

Specification:
Aérospatiale SA 342M
Type: military utility helicopter
Accommodation: two pilots in front with optional bench seat behind for three which folds down for cargo carrying; sling for 700-kg (1,543-lb) freight load and hoist for 300 lb (135 kg)
Armament: option for two machine-guns or 20-mm cannon, two pods of 2.75-in or 68-mm rockets, four/six HOT missiles, or four AS.11 or two AS.12 missiles
Powerplant: one 859-shp (641-kW) Turboméca Astazou XIV turboshaft
Performance: maximum speed 310 km/h (193 mph); cruising speed 238 km/h (148 mph); range with 500-kg (1,102-lb) payload 360 km (223 miles)
Dimensions: main rotor diameter 10.5 m (34 ft 5½ in); fuselage length 9.53 m (31 ft 3¼ in); height 3.18 m (10 ft 5¼ in); main rotor disc area 86.5 m^2 (931 sq ft)



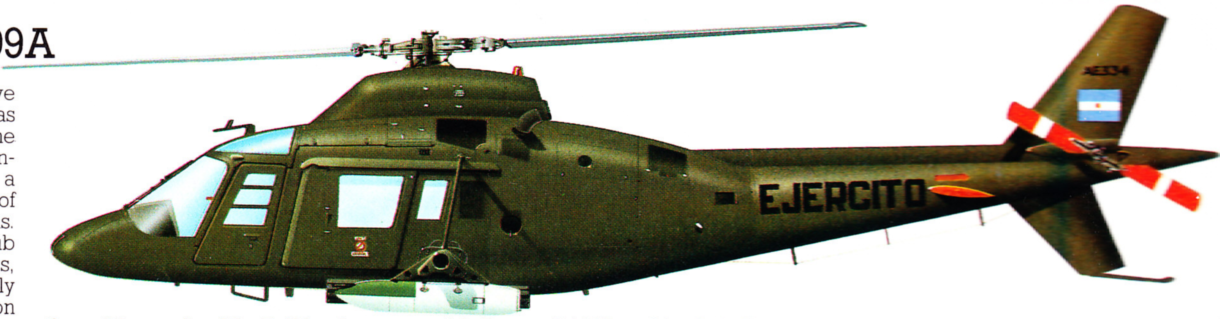
An Aerospatiale SA 342 Gazelle of the Kuwaiti air force. In the Falklands war British army Gazelles were urgently torn apart and given folding blades, armour, IFF, radar altimeter and various guns. This SA 342 has fixed gun pods.

Firing a HOT anti-tank missile from an Aérospatiale Gazelle. This light helicopter carries four such missiles, the SA 342M version being fitted with a roof-mounted sight.

ITALY

Agusta A 109A

One of the most aesthetically attractive helicopters, the **Agusta A 109A** was planned as a streamlined twin-turbine machine for a pilot and seven passengers, with all-weather avionics and a cabin easily adaptable for a variety of other civil and military applications. The main rotor has an articulated hub and aluminium honeycomb blades, and the tricycle landing gear is fully retractable. The first example flew on 4 August 1971 and soon ambulance, cargo and SAR (search and rescue)



One of the spoils of the Falklands war was this Agusta A 109A multi-role helicopter captured by the 3rd Commando Brigade Air Sqn.

versions were on order, with deliveries beginning early in 1976. In 1975 development began of armed versions and by 1983 Agusta offered an **A 109A Aerial Scout** with machine-gun, rockets, stabilized sight and special communications; an **A 109A Light Attack** in various sub-types with rockets and machine-guns for soft targets or the Hughes TSU (telescope sight unit) on the nose and tubes for up to eight TOW missiles; an **A 109A Command and Control** for target designation and direction of attack helicopters, and with the armament options of the A 109A Light Attack; an **A 109A Utility** for cargo or casevac patients, and provision for a slung load of 907 kg (2,000 lb); an **A 109A ESM/ECM** with comprehensive electronic warfare systems including passive receivers, active jammers and dispensed payloads; and an **A 109A Naval** for ASW, anti-ship, stand-off missile guidance, SAR, patrol, EW and many other duties. The proposed armament for the A 109A Naval is a pair of AS.12 or AM-10 wire-guided missiles, and the type can also be fitted to provide guidance correction for the Otomat ship-launched anti-ship missile. Various sensors are available as customer options. In 1981 production began to switch to the **A 109A Mk II** with an uprated transmission for greater weights and speeds.

Specification

Agusta A 109A Mk II

Type: multi-role helicopter

Accommodation: up to eight seats of which front two may both be pilots, plus provision for 907-kg (2,000-lb) slung load, 150-kg (331-lb) hoist, two stretchers and two attendants or more than 60 special role fits including wide range of weapon schemes

Powerplant: two 420-shp (313-kW) Allison 250-C20B turboshafts

Performance: maximum speed at maximum weight 269 km/h (184 mph); cruising speed 230 km/h (143 mph); range, not stated except with maximum fuel and no reserves 548 km (341 miles)

Weights: empty, depending on equipment from 1551 kg (3,419 lb) to 1889 kg (4,164 lb); maximum take-off 2600 kg (5,732 lb)

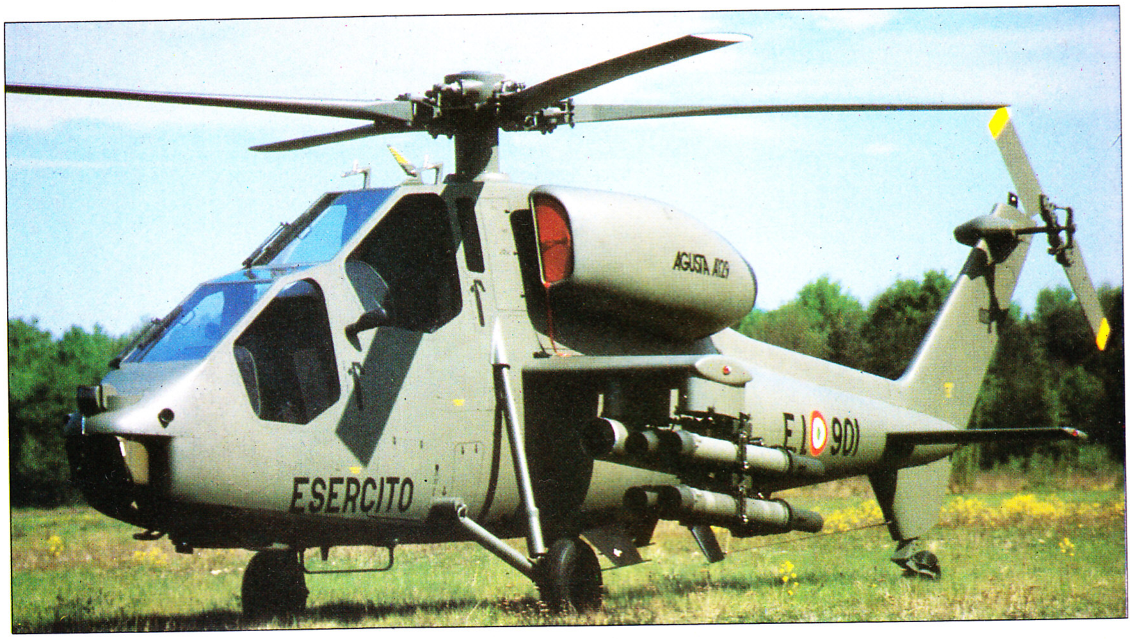
Dimensions: main rotor diameter 11.0 m (36 ft 1 in); fuselage length 10.7 m (35 ft 1½ in); height 3.3 m (10 ft 10 in); main rotor disc area 95.03 m^2 (1,023.0 sq ft)

ITALY

Agusta A 129

History and Notes

The **Agusta A 129** is an armed scout and anti-tank helicopter, and was launched in 1978 as a special variant of the A 109, named Mangusta (Mongoose). The name has since been dropped, and the A 129 has grown in weight and capability to an extent that it is today a completely different helicopter in the class of medium-weight helicopter gunships. It is being designed both for the Italian army and for export. The deep but slim fuselage has cockpits for the pilot, high at the rear, and for the co-pilot/gunner, low in the nose, both with flat glazed panels to avoid glint and with the side panels explosively jettisoned for emergency escape. A Harris digital integrated multiplex data system links every part of the A 129 to manage propulsion, navigation, systems and utilities, communications, power distribution and fire control with various weapons. The nose is occupied by the stabilized night/all-weather night sytem, which in the initial production A 129 is the Hughes TOW sight unit, with a FLIR (forward-looking infra-red) sensor for target acquisition and designation and with a laser for precise ranging. Alternatives include a Martin Marietta mast-mounted sight and pilot's helmet sight/display and night-vision equipment. Agusta is building a static test A 129 plus four flight prototypes (the first due to fly in 1983) and is following with 67 production articles for the Italian Army Aviation.



Many nations are considering buying the Agusta A 129, shown here as a full-scale mock-up with eight Hughes TOW guided missiles.

Specification

Agusta A 129

Type: anti-armour and armed scout helicopter

Armament: Italian version has four pylons for eight (two quadruple units) TOW missiles plus either two 12.7-mm (0.5-in) guns or two pods each with seven or 19 70-mm (2.75 in) rockets

Powerplant: two Rolls-Royce Gem 2-2 turboshafts each with an emergency rating of 1,035 shp (772 kW)

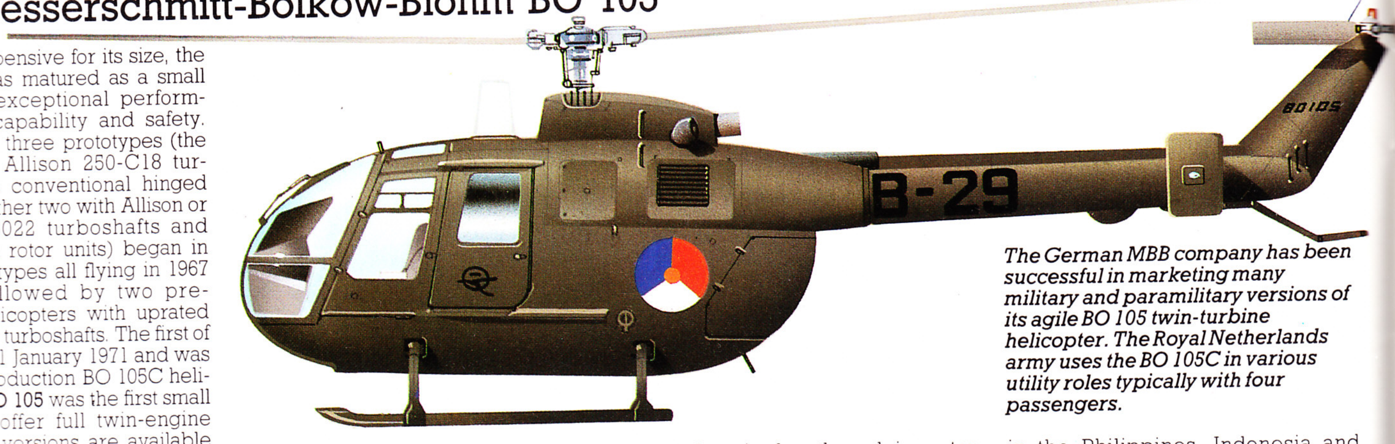
Performance: maximum speed 270 km/h (168 mph); range with weapons 574 km/h (357 miles)

Weights: empty 2530 kg (5,575 lb); maximum take-off 3655 kg (8,058 lb)

Dimensions: main rotor diameter 11.9 m (39 ft 0½ in); fuselage length 12.275 m (40 ft 3¼ in); height 3.35 m (11 ft 0 in); main rotor disc area 111.2 m^2 (1,197.0 sq ft)

WEST GERMANY

Messerschmitt-Bölkow-Blohm BO 105



The German MBB company has been successful in marketing many military and paramilitary versions of its agile BO 105 twin-turbine helicopter. The Royal Netherlands army uses the BO 105C in various utility roles typically with four passengers.

Though it is expensive for its size, the **MBB BO 105** has matured as a small helicopter of exceptional performance, agility, capability and safety. Construction of three prototypes (the first with two Allison 250-C18 turboshafts and a conventional hinged rotor, and the other two with Allison or MAN-Turbo 6022 turboshafts and hingeless main rotor units) began in 1964, the prototypes all flying in 1967 and being followed by two pre-production helicopters with uprated Allison 250-C20 turboshafts. The first of these flew on 11 January 1971 and was followed by production BO 105C helicopters. The **BO 105** was the first small helicopter to offer full twin-engine safety, and all versions are available with all-weather avionics and very comprehensive equipment. A particular feature of all versions is the rigid main rotor with a hingeless (except for the feathering hinge) hub of forged titanium carrying efficient blades of glassfibre-reinforced plastics. In the passenger role most versions seat five, though there is a lengthened six-seater and MBB in partnership with Kawasaki of Japan is also producing the 8/10-seat **BK 117**. Versions are being assembled in the Philippines, Indonesia and Spain, but the biggest military customer has been Federal Germany itself. The Heer (army) has **227 BO 105M**

(VBH) observation machines with many advanced features. A prototype is investigating further types of all-weather sights and displays. The Heer has also deployed a further 212 of the **BO 105P** type as the **PAH-1** (anti-armour helicopter No. 1). These have six HOT anti-tank missiles, a stabilized all-weather sight above the cabin, Doppler navigation and numerous items for battlefield protection. Each army corps has an anti-tank PAH regiment with two squadrons of 28 helicopters operating in four flights of seven. A further 21 are reserved for special duties with the 6th Panzergrenadier Division. The type is also the basis of the BO 105/Ophelia (Optique Platforme HELIcoptère Allemande) advanced experimental model. This has a mast-mounted sight (forward-looking infra-red and TV sensors and a laser rangefinder) in a spherical mounting above the rotor head, and head-up/head-down displays in the cabin. The type also has provision for helmet-mounted sights and displays, and began flight trials in 1981.

Specification

MBB BO 105P (PAH-1)

Type: anti-tank helicopter

Armament: normally six HOT missiles on lateral outriggers, with quick-reload of launch tubes

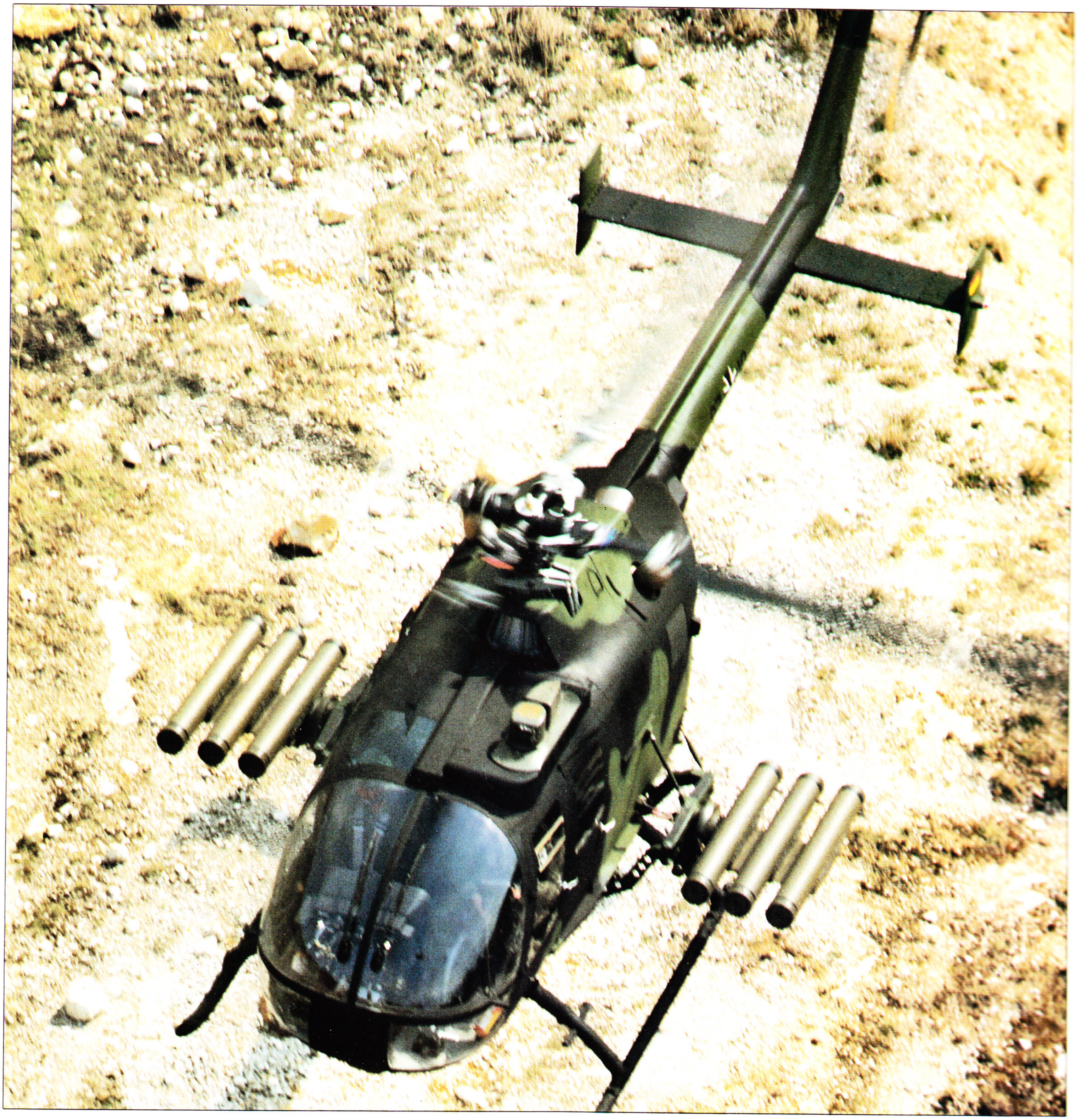
Powerplant: two 420-hp (313-kW) Allison C20B turboshafts

Performance: maximum continuous speed 210 km/h (130 mph); mission endurance with 20-minute reserve 1 hour 30 minutes

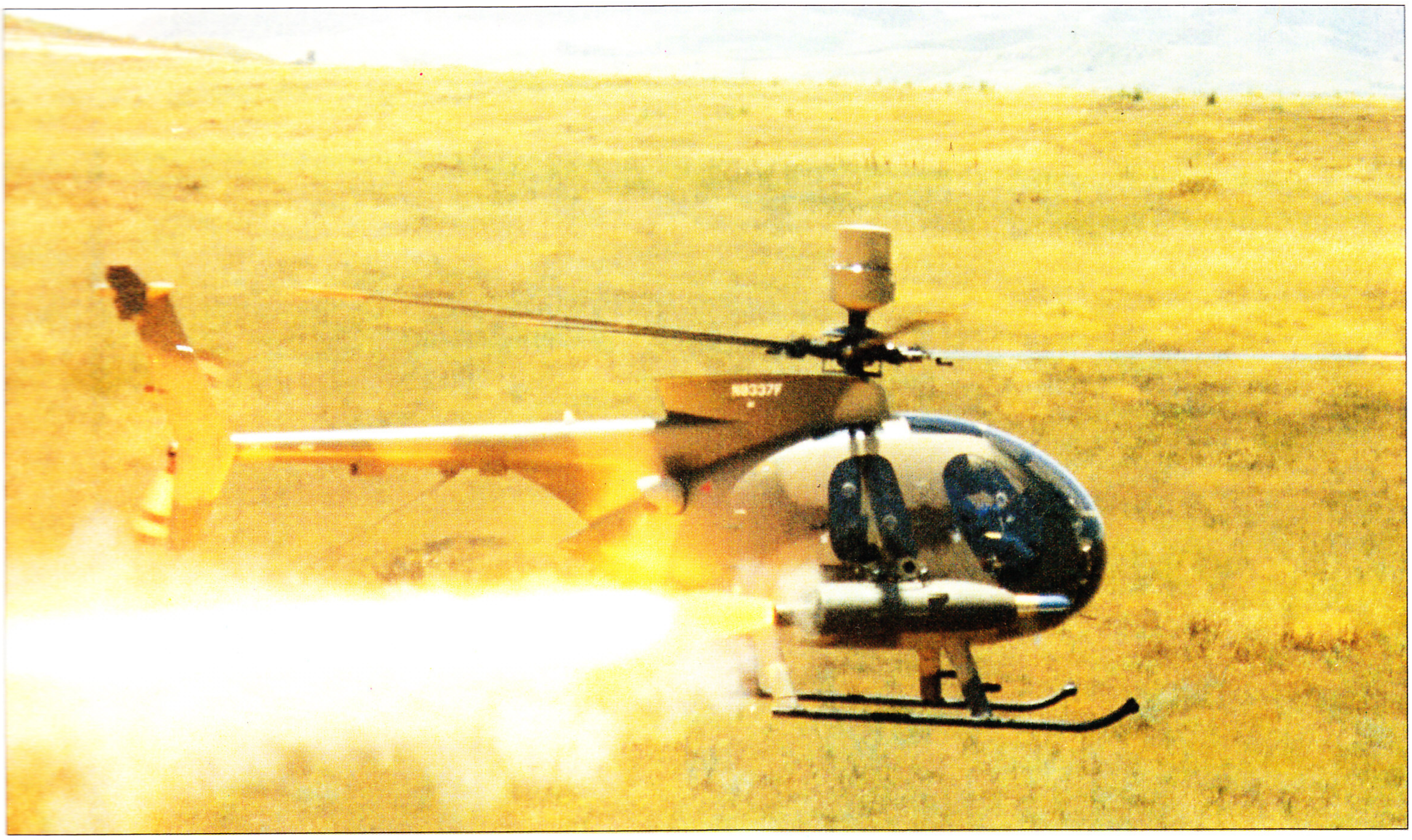
Weights: empty 1322 kg (2,915 lb); maximum take-off 2400 kg (5,291 lb)

Dimensions: main rotor diameter 9.84 m (32 ft 3½ in); fuselage length (plus tail rotor) 8.56 m (28 ft 1 in); height 3.0 m (9 ft 10 in); main rotor disc area 78.65 m² (846.6 sq ft)

The BO 105P, selected as PAH-1 (anti-tank helicopter type 1) by the West German army. Six HOT missiles are carried in their sealed tubes on outrigger pylons, the stabilized sight being mounted in the cabin roof.



Anti-tank helicopter warfare



Firing a TOW high-speed anti-tank missile from one of the two twin pods carried by a Hughes 500 MD Defender, which is also equipped with a mast-mounted sight. In such flat terrain the high position of the sight cannot give concealment.

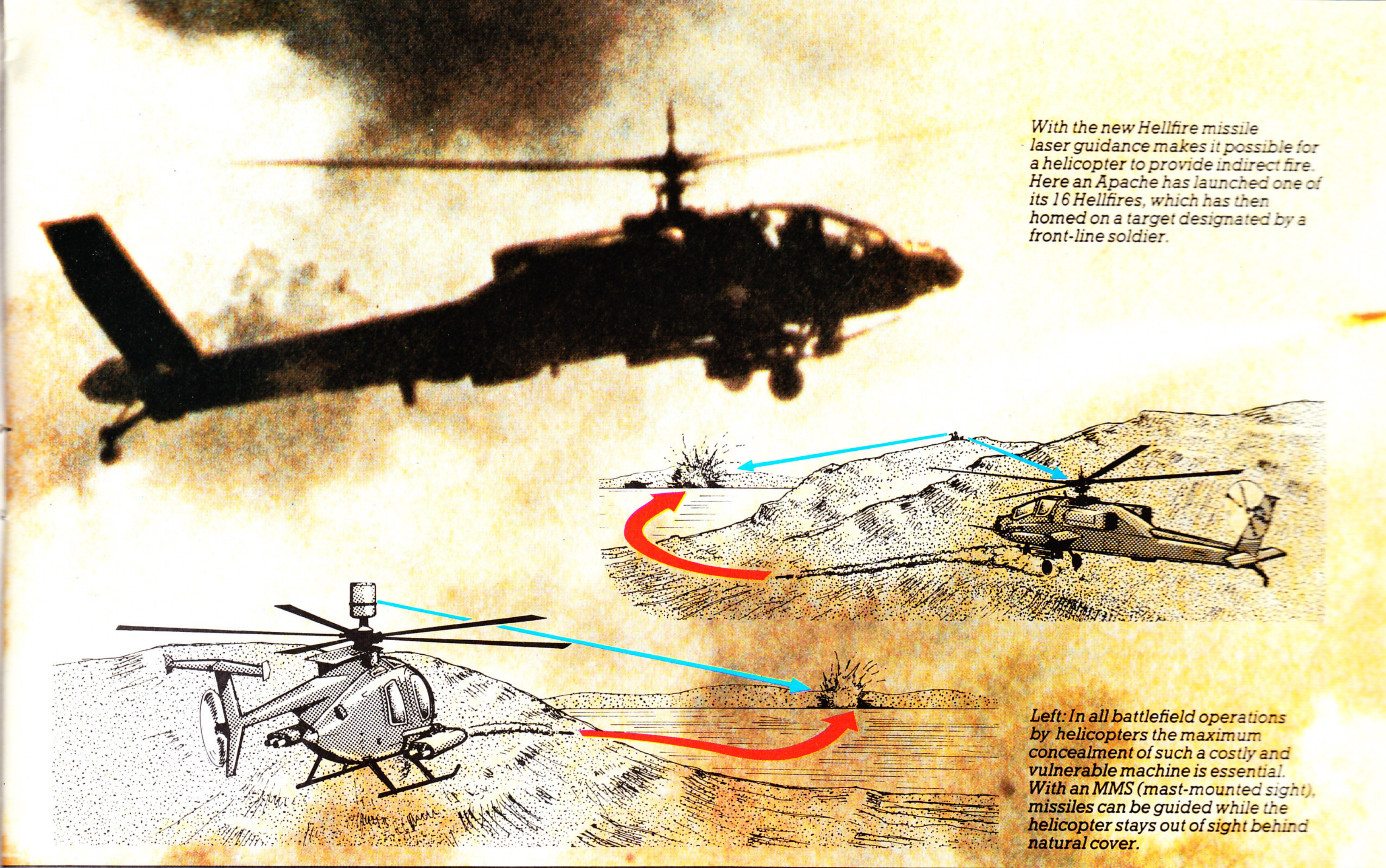
It was the French who first gave the helicopter significant capability against tanks, by fitting small turbine-engined Sud-Aviation Alouette IIs with batteries of four AS.10 (later AS.11) wire-guided missiles. These early missiles were quite effective but not easy to steer accurately: the operator tended to over-correct, or find it difficult to co-ordinate steering in both the lateral and vertical planes, and in a vibrating small helicopter with distorting Plexiglas from screen panels the task was likely to prove too much. The first major advance was development by Nord-Aviation (later Aérospatiale) of an improved guidance called TCA (Télé-Command Automatique) in which the operator was absolved of the need to make manual steering corrections to the missile's trajectory; all he had to do was keep the sight exactly on target and the missile automatically flew along the centre of a parallel line defined by an IR (infra-red) sensing system. TCA and related systems made direct hits probable even at the extended range of up to 4 km (2.5 miles) achieved by second-generation anti-tank missiles.

One of the fundamental requirements of an anti-tank helicopter is that it should be able to see the enemy without itself being visible. Particularly in the USA, there has been an emphasis on making anti-tank helicopters better able to withstand hostile fire; although extremely successful in the case of strikes by bullets, this philosophy has tended to distract attention from the basic fact that every modern army has large numbers of close-range SAMs which are almost certain to destroy a helicopter with a single shot. It is amazing that the newest anti-tank helicopter, the USA's Hughes AH-64A Apache, should after a decade of development be burdened by armour and features protecting it against small-arms fire up to at least 20 mm, yet be unable to engage its targets without exposing itself fully to gunfire and SAMs. This is because the stabilized sight system, its vital 'eyes', is at the very bottom of the nose!

No anti-tank helicopter crew would disagree with the assertion that such

A dramatic photograph showing the way in which such compact machines as the Defender can hide amongst natural cover. Usually the helicopter would get behind cover and look over the top with its mast-mounted sight, which can provide a stable magnified image.

An MBB BO 105 anti-tank helicopter displays its mast-mounted sight, which affords this agile aircraft the opportunity to remain out of sight until it needs to fire its weapons.

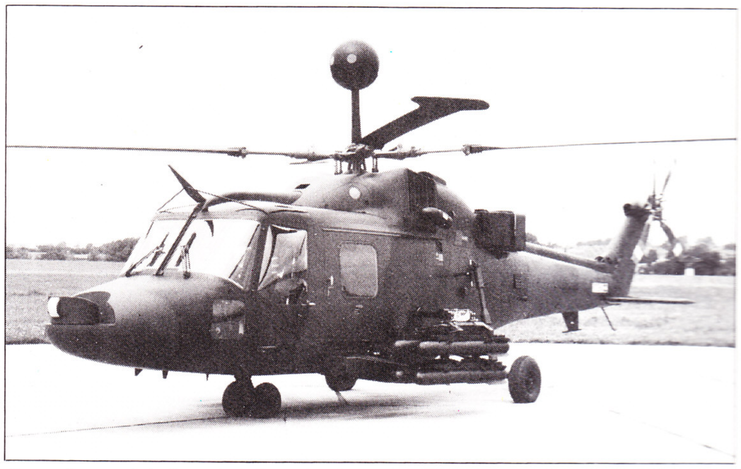


With the new Hellfire missile laser guidance makes it possible for a helicopter to provide indirect fire. Here an Apache has launched one of its 16 Hellfires, which has then homed on a target designated by a front-line soldier.

***Left:** In all battlefield operations by helicopters the maximum concealment of such a costly and vulnerable machine is essential. With an MMS (mast-mounted sight), missiles can be guided while the helicopter stays out of sight behind natural cover.*

helicopters are only as good as their 'eyes'. The most basic form of vision device is a stabilized monocular sight, in essence a small telescope giving a small (×2 to ×4) magnification for a quick search and a much greater enlargement (×10 and upwards) for long-range weapon guidance. The eyepiece has to be retractable, and folded down when needed so that it comfortably fits any size of observer. The latter has a control with which he can aim the other end of the sight system which projects outside the helicopter, preferably above the roof or above the hub of the rotor on a mast. The sight head has to be gyrostabilized to hold steady on a target no matter how the helicopter may be cavorting, and the whole sight has to incorporate or be able to interface with an IR night-vision device, with a laser ranger and target designator, and with a helmet sight worn by either member of the crew.

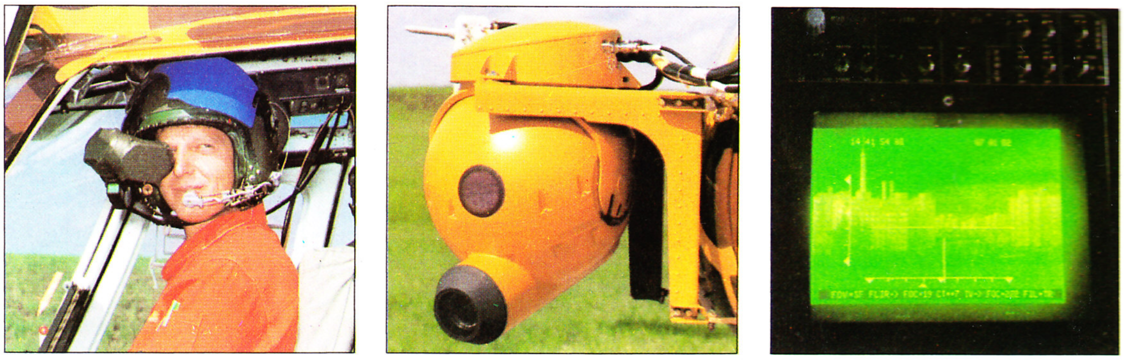
Almost always there are two crew in an anti-tank helicopter. The pioneer Bell AH-1 HueyCobra established the rule that the seats should be in tandem, the rear seat being higher than the front, and that though there should be primary flight controls in both cockpits the chief pilot should be at the rear. Bell's second-generation rival to the AH-64A reversed this arrangement, putting the pilot in the nose; nobody else has followed this arrangement and it was not adopted. Anti-tank versions of existing machines, such as the Westland Lynx 3, Aérospatiale SA 342M and MBB BO 105P, seat the crew side-by-side. So far little attention appears to have been paid to what seems the obvious alternative to today's large anti-tank helicopters: the small single-seater with great agility and much reduced visual or radar cross-section, yet carrying the same sensors and weapons as the vulnerable monsters in use (or planned for use) today.



A mock-up of the Lynx Mk 3, which is optimized for anti-tank operations. Among the many improvements over previous examples is increased structural strength, quicker rotor blades, tougher undercarriage, mast-mounted or roof-mounted sights, a thermal imager in the nose linked to the pilot's helmet-mounted display, extra fuel and a greatly enhanced weapons load including guns, missiles and rockets of many types.

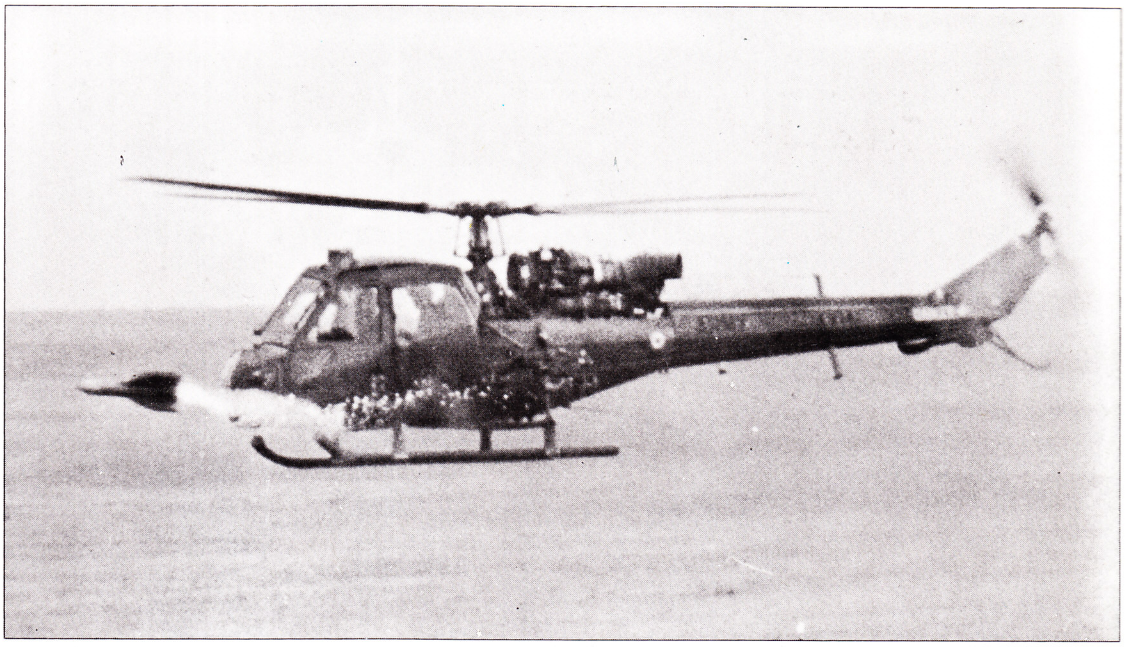
Helicopter sight systems

West Germany is well advanced with night and bad visibility sighting systems for its BO 105 dedicated anti-tank helicopter. (1) shows a helmet sight system which enables the sensors to follow the observer's visual scan or, conversely, direct the wearer's attention onto a target. The camera unit in (2) is a LLTV unit, which is paired with a FLIR camera. The observer is offered a choice of enhanced images (3) depending on local flight conditions.



UK

Westland Scout



An ATGW Scout helicopter from No. 652 Aviation Squadron, Army Air Corps, is seen firing an AS-11 anti-tank guided weapon, live, at tank targets.

One of the few helicopters of exclusively British design to have been built in quantity, the **Westland Scout** was developed from the **Saunders-Roe P.531**, which was taken over when the parent company was absorbed by Westland in 1959. The first P.531 was flown on 20 July 1958 on the power of a 400-shp (298-kW) Blackburn (Turboméca) Turmo 603 turboshaft, derated in this application to 325 shp (242 kW). The Royal Navy showed an immediate interest in the type, and this was instrumental in the development of the type as an operational helicopter. The British army was also interested in the type as a light battlefield helicopter, and the chosen powerplant was the 710-shp (529-kW) Turboméca A.129, derated to 635 shp (474 kW) and developed in the UK by Bristol Siddeley as the Nimbus. The first version of the British army was the **P.531-2 Mk 1**, essentially a pre-production and development variant which first flew in August 1960. This proved so successful that only one month later the British Army placed its initial production contract for the **Scout AH.Mk 1,** which differed from earlier models only in having powered controls. The first Scout AH.Mk 1 flew in March 1961, and the type began to enter service early in 1963 as a replacement for the Saunders-Roe Skeeter, which it clearly outmoded by its combination of greater reliability, substantially improved payload and general operating superiority. Production amounted to 160 Scout AH.Mk 1 helicopters, and these have since 1963 been standard multi-role tactical aircraft with skid landing gear, a five/six-seat cabin and the Nimbus 101 or 102 turboshaft. External loads can include two litters in side-mounted pods, and a variety of weapons. The rear bench seat, which normally accommodates three passengers, can be removed to provide space for two more litters. The type has proved its operational versatility, operating in the close-support, liaison, light freighting, medevac, communication, reconnaissance, SAR and training roles. Small numbers of the Scout were exported, mainly to Jordan, Australia, Bahrain and Uganda. More than 100 Scouts remain in service with the British army, mainly in second-line roles.

Specification

Westland Scout AH.Mk 1

Type: multi-role tactical helicopter

Armament: this can include various combinations of guns up to 20-mm calibre and rocket pods, or AS.11 anti-tank missiles

Powerplant: one Rolls-Royce (Bristol) Nimbus Mk 101 or Mk 102 turboshaft derated from 1,050 shp (783 kW) to 685 shp (511 kW)

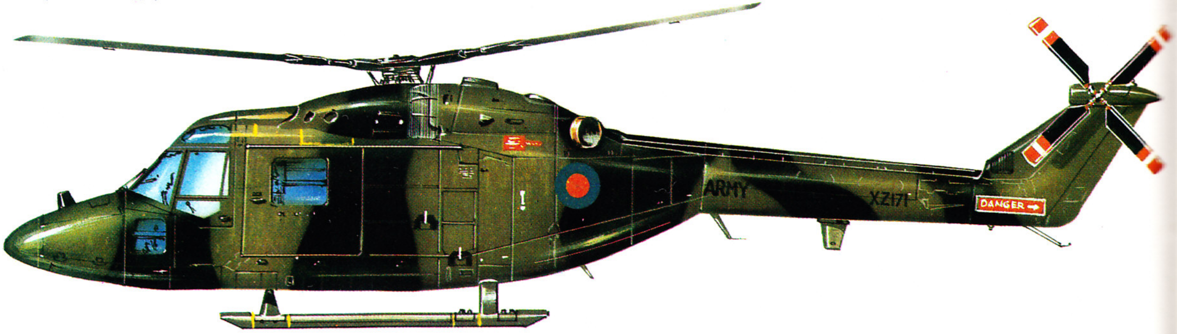
Performance: maximum speed 211 km/h (131 mph) at sea level; range 505 km (314 miles) with maximum fuel and five persons

Weights: empty 1465 kg (3,232 lb); maximum take-off 2405 kg (5,300 lb)

Dimensions: main rotor diameter 9.83 m (32 ft 3 in); fuselage length 9.24 m (30 ft 4 in); height 2.72 m (8 ft 11 in); main rotor disc area 75.9 m^2 (16.9 sq ft)

UK

Westland Lynx (Army)



Capable of being armed with a wide assortment of weapons, the Lynx is also tasked with carrying MILAN armed anti-tank teams.

Launched as part of the Anglo-French helicopter agreement of February 1967, the **Westland Lynx** is an extremely modern and versatile machine. Its design is wholly of Westland origin, but the production of the type is shared in the ratio of 70/30 between the UK and France, in the form of the nationalized Aérospatiale concern. One of the primary French responsibilities is the forged titanium hub, a one-piece structure for the four-blade semi-rigid main rotor which is one of the most important features of the design. All versions of the Lynx have advanced digital flight controls plus all-weather avionics, and no previous helicopter can equal the type for agility and all-weather one-man operation. The origins of the design lie with the **WG.13** proposal, which was schemed in general-purpose naval and civilian applications. But so versatile did the design appear that the concept was expanded to land-based tactical operations in which the type's agility and performance would prove a very considerable asset. The first prototype of the Lynx flew on 21 March 1971, and the six prototypes were used exhaustively for all aspects of the certification programme, for trials and for record-breaking. The second production model was the **Lynx AH.Mk 1** battlefield helicopter for the British army. This first flew on 11 February 1977, and the type was cleared for service introduction at the end of 1977. Since that time the Lynx has built up an enviable reputation as a versatile battlefield helicopter, being able to carry up to 12 troops in addition to a crew of two, or 907 kg (2,000 lb) of internal freight, or a slung load of 1361 kg (3,000 lb), or a wide assortment of weapons including eight TOW anti-tank missiles aimed with a stabilized sight mounted in the flightdeck roof. The chief distinguishing feature of the land-based Lynx is its skid landing gear, the naval Lynx having wheeled tricycle landing gear.

Westland is producing variants of the basic design, including the current **WG.30** and the future **Lynx 3.** The WG.30 is designed for civil and military applications, and is in essence a 'big-fuselage' Lynx with uprated powerplant and larger-diameter main rotor, and can carry up to 22 troops. The Lynx 3 is a more advanced armed development of the Lynx AH.Mk 1; among its features are the ability to carry HOT, TOW or Hellfire anti-tank missiles (with reloads in the cabin, a technique pioneered with the Lynx AH.Mk 1), and to carry the Stinger air-to-air missile for self-defence or the destruction of enemy helicopters over the battlefield. Sensors proposed for the Lynx 3 are either a chin- or mast-mounted package of target-acquisition and night-vision items. With a maximum take-off weight of 5443 kg (12,000 lb), the Lynx 3 will also be able to lift 14 troops over a range of 105 km (65 miles). The prototype should fly by 1986, with deliveries beginning shortly after this.

Specification

Westland Lynx AH.Mk 1

Armament: weapons can include a 20-mm cannon, a 7.62-mm (0.3-in) Minigun, rocket pods, or various types of air-to-surface missile including HOT, TOW and AS.11

Powerplant: two 900-shp (671-kW) Rolls-Royce Gem 41 turboshafts, each flat-rated to 750 shp (559 kW)

Performance: maximum speed 259 km/h (171 mph); range 540 km (336 miles) with a full load of troops

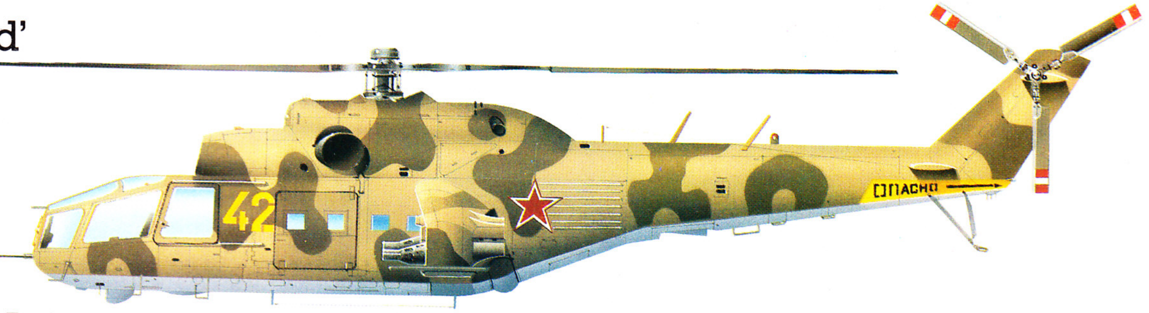
Weights: empty, equipped for anti-tank strike 3072 kg (6,772 lb); maximum take-off 4,536 kg (10,000 lb)

Dimensions: main rotor diameter 12,802 m (42 ft 0 in); length overall, rotors turning 15.163 m (49 ft 9 in); height 3.66 m (12 ft 0 in); main rotor disc area 128.69 m^2 (1,385.35 sq ft)

Taken in 1977, this picture shows the second production Lynx AH.Mk 1 for the British army. Since then over 100 have been delivered, of which 60 in Germany are being equipped with the Hughes TOW, with a stabilized roof-mounted sight. Westland is now developing the Lynx 3 as a dedicated armed helicopter.

USSR

Mil Mi-24 'Hind'



The first version of the Mi-24 to be built in large numbers was 'Hind-A', with four weapon pylons, two twin 'Swatter' missile rails and a heavy machine-gun.

The **Mil Mi-24 'Hind'** is a most important combat helicopter family, and has dynamic parts (engines and rotors) bearing close kinship with those of the Mi-8, yet while the main rotor is considerably smaller in diameter the engines are much more powerful! The series was designed to be able to assault-land a squad of infantry and support the squad from the air with gunfire, rockets and missiles. The Mi-24 is thus a massive helicopter but agile for the bulk, and probably flew in prototype form in the early 1970s, entering service in 1973. The first Mi-24 version, called **'Hind-A'** by NATO, was initially seen in large numbers in East Germany in 1974, and so is thought to have flown as a prototype in about 1968. Its fuselage is divided into a large cockpit area for a normal flight crew of four (pilot, co-pilot, gunner/navigator with heavy machine-gun, and forward observer) and an unobstructed main cabin for eight fully equipped troops. On each side large wing-like weapon arms (which do in fact give lift in forward flight) slope sharply downwards and support six pylons, four of them for rocket pods, bombs or other heavy stores and the outermost carrying twin rails for a total of four AT-2 'Swatter' guided missiles for use against armour or other hard targets. The 'Hind-A' was in fact preceded into service by the **'Hind-B'**, with straight wings lacking the tip stations for missiles. The **'Hind-C'** is similar to the 'Hind-A' but lacks the nose gun and tip stations for missiles. Relatively few were built. Larger numbers have been built of another model, **'Hind-D'**, which has a revised airframe with the tail rotor moved from the right to the left of the swept fin, and a new nose equipped for a pilot at the upper level and a weapon operator lower down in the extreme nose, and with the greatest array of tactical sensors, weapon-aiming systems, communications, EW devices and all-weather avionics ever seen on a helicopter. This is a true gunship helicopter with a rotary-barrel heavy machine-gun under the nose. Well over 1,000 of many sub-types had been built by 1983, about 150 being exported to five client states, and development has continued with the **'Hind-E'** (AT-6 'Spiral' tip missiles and improved sensors) and **'Hind-?'** without the undernose machine-gun but with a twin-barrel 23-mm cannon on the right side of the nose.

Specification

Mil Mi-24 'Hind-D'

Type: tactical gunship helicopter

Armament: one 12.7-mm (0.5-in) four-barrel gun in remote-control turret under nose for use against ground or aerial targets; four inboard weapon pylons for various loads (usually 32-tube 57-mm/2.24-in rocket pods) and two outboard pylons for twin launch rails for AT-2 'Swatter' or AT-6 'Spiral' laser-homing anti-armour missiles

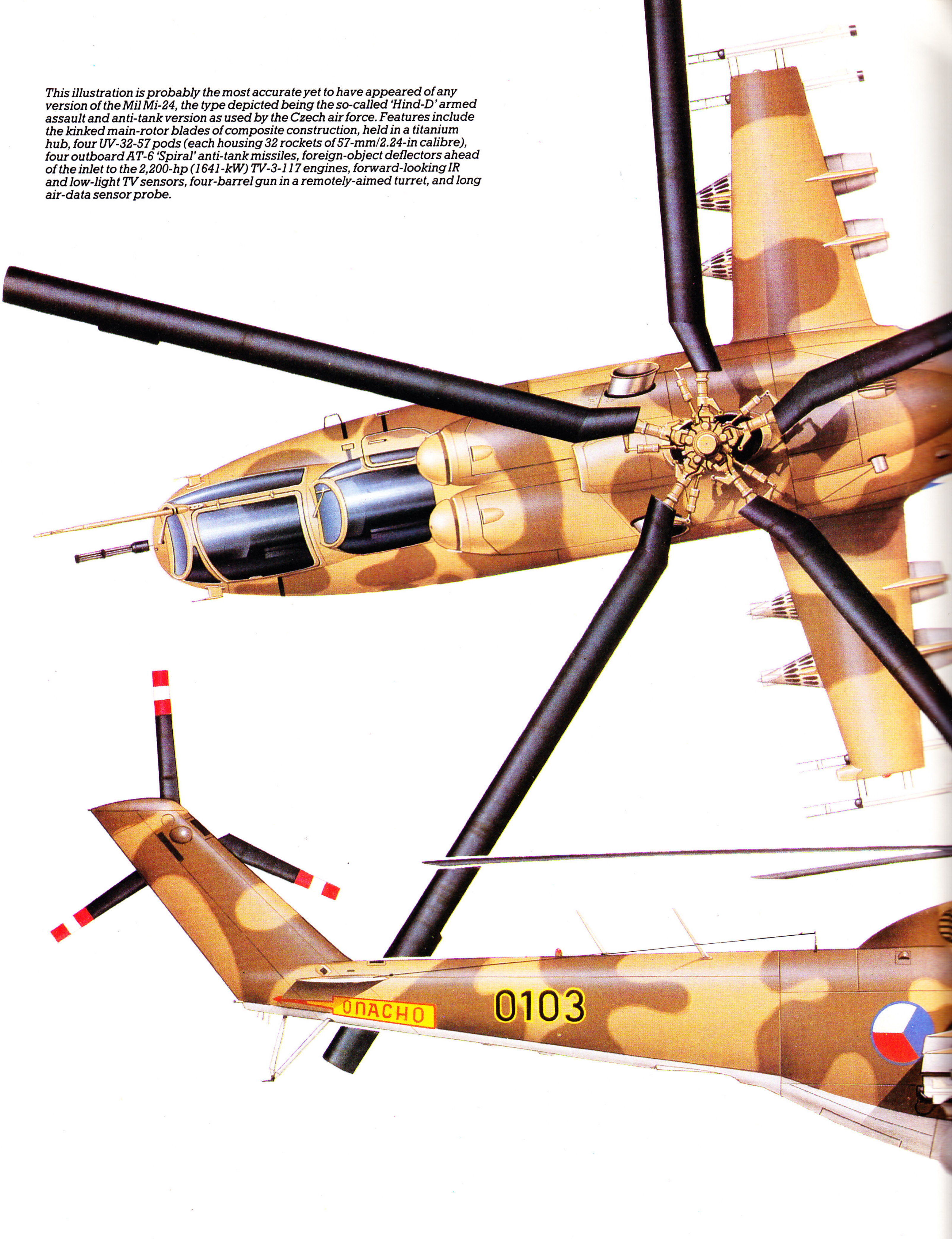
Powerplant: two 2,200-hp (1641-kW) Isotov TV3-117 turboshafts

Performance: maximum speed 346 km/h (215 mph); range with maximum weapon load 900 km (559 miles)

Weights: empty about 6500 kg (14,300 lb); maximum take-off 11500 kg (25,400 lb)

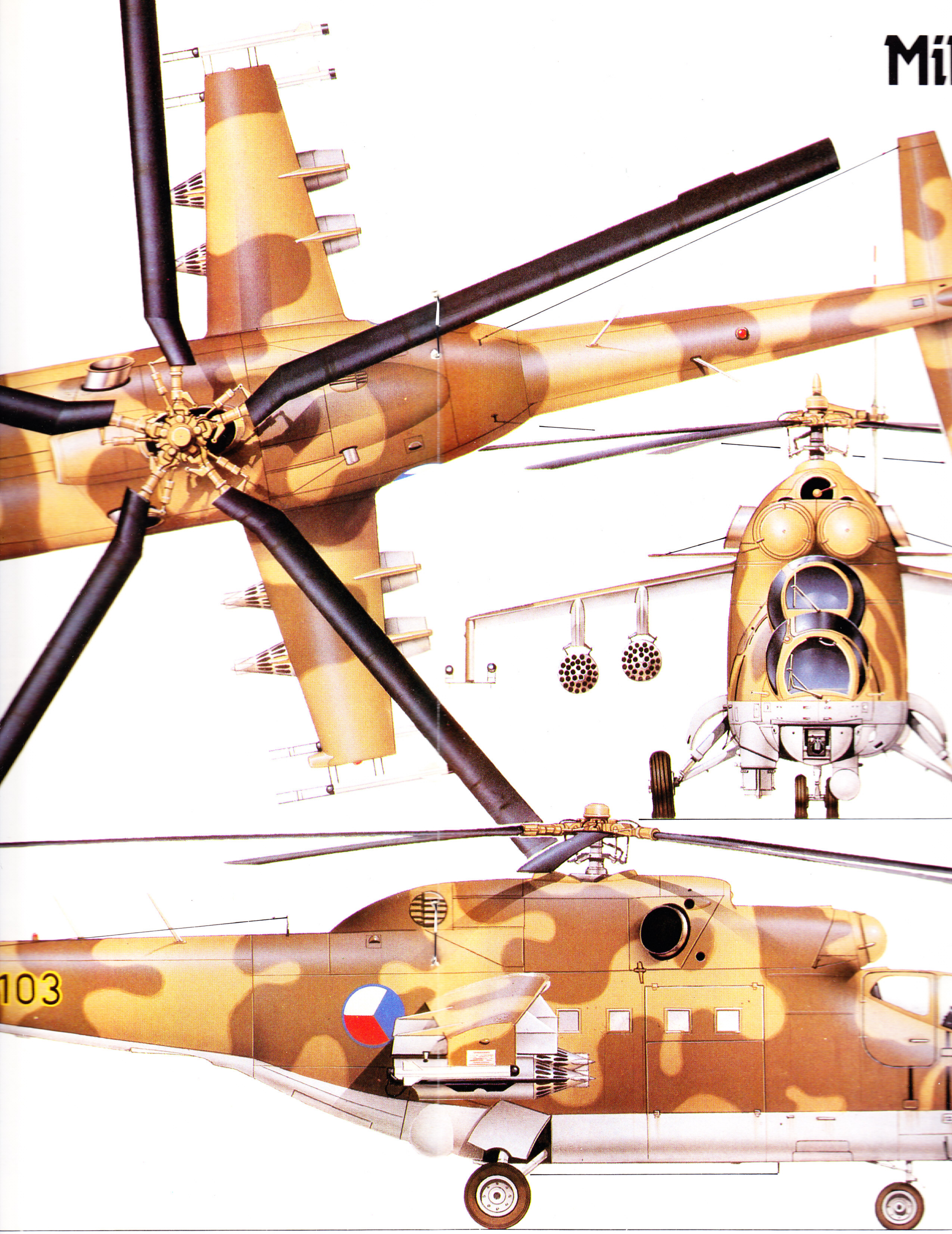
Dimensions: main rotor diameter about 17.0 m (55 ft 9 in); fuselage length 17.0 m (55 ft 9 in); height 4.25 m (14 ft 0 in); main rotor disc area 227.0 m^2 (2,443.5 sq ft)

This illustration is probably the most accurate yet to have appeared of any version of the Mil Mi-24, the type depicted being the so-called 'Hind-D' armed assault and anti-tank version as used by the Czech air force. Features include the kinked main-rotor blades of composite construction, held in a titanium hub, four UV-32-57 pods (each housing 32 rockets of 57-mm/2.24-in calibre), four outboard AT-6 'Spiral' anti-tank missiles, foreign-object deflectors ahead of the inlet to the 2,200-hp (1641-kW) TV-3-117 engines, forward-looking IR and low-light TV sensors, four-barrel gun in a remotely-aimed turret, and long air-data sensor probe.

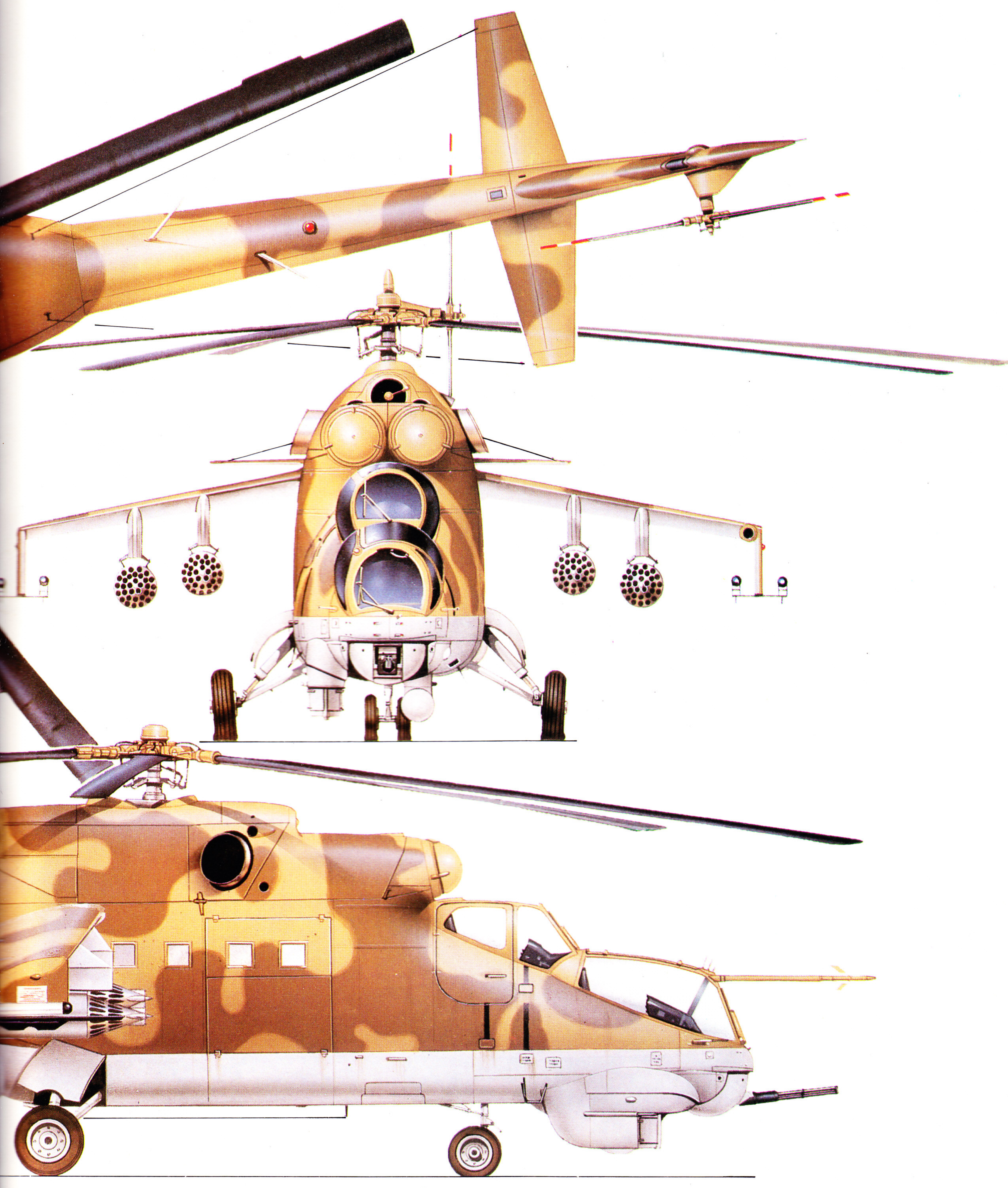


Keith Fretwell

Mi

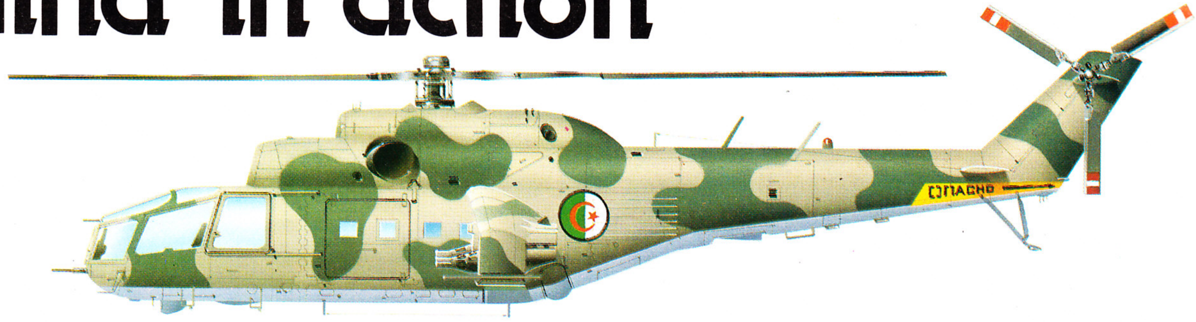


Mil Mi-24 'Hind-D'



Mi-24 'Hind' in action

The USSR has exported Mi-24 assault helicopters to Afghanistan, Algeria, Cuba, Iraq, Libya and South Yemen, in addition to members of the Warsaw Pact. Most have been twin-cockpit gunships, but Algeria has also received some of the earlier 'Hind-A' model. These have a large enclosed flight deck for a four-man crew, but lack many of the night and all-weather sensors of the gunships.



Many Western observers still find it hard to understand how the USSR can spend very large sums to procure military hardware of new and carefully optimized design when something already in existence could easily be modified to do the job. Nothing better illustrates this apparent disregard for cost than the Mil Mi-24 'Hind' family of helicopters. It would have been simpler merely to extend the already diverse family of Mi-8 'Hip' and Mi-17 helicopters, which have the enormous benefit of over 8,000 production examples (eight times more than any Western helicopter of comparable size or power). Instead the Mi-24 was started almost from the proverbial clean sheet of paper.

Greater agility

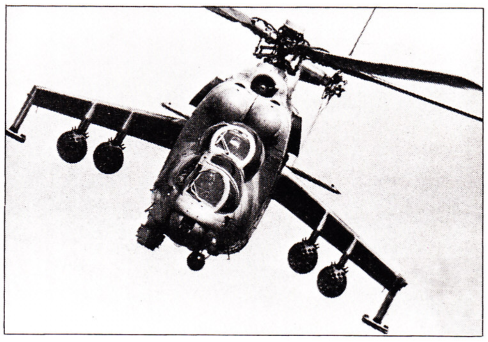
From the start the Mi-24 was tailored exactly to carrying a squad of eight assault troops in a main cabin with large doors on each side for rapid egress, whilst simultaneously carrying heavy armament to suppress opposition by hostile ground forces. In fact the basic external weapon load comprises four anti-tank guided missiles plus four other stores such as UV-32 rocket pods. This is nothing like as much as the Mi-8 and Mi-17 can carry; these have cabins seating up to 32, and external pylons for four missiles plus six UV-32s or similar loads. Why, then, develop the Mi-24?

The main answer is that the new helicopter was designed for greater agility, achieved by a higher ratio of power to weight, combined with much more extensive armour and other protection against ground fire. A second reason is that in several versions the Mi-24 has a 'gunship' nose packed with advanced sensors and weapon-aiming systems, and again these are better suited to a smaller, high-power helicopter than to the large Mi-8 series.

NATO knew about the new helicopter for two years before the first photographs were seen in 1974, and has allotted the reporting name 'Hind'. The first major production version, 'Hind-A', has a tail rotor very similar to that of the Mi-8 family, but in all other versions it is moved to the left side of the fin, to pull instead of push. This early model, first identified in East Germany in early 1974, has a nose cockpit for a flight crew of four, comprising pilot, co-pilot, navigator/gunner, and forward observer. The last sometimes forms part of the payload and on arrival at the landing or drop zone departs as squad commander. Normal weapon load is 1275 kg (2,810 lb), and the mix of four missiles (usually AT-2 'Swatter') anti-tank weapons and four UV-32 pods is almost universal. In the nose is a heavy machine-gun, of 12.7- or 14.5-mm (0.5- or 0.57-in) calibre, almost certainly slavable to a sighting system under the nose which provides a gyrostabilized picture of ground targets which can be magnified up to about ×10 when necessary.

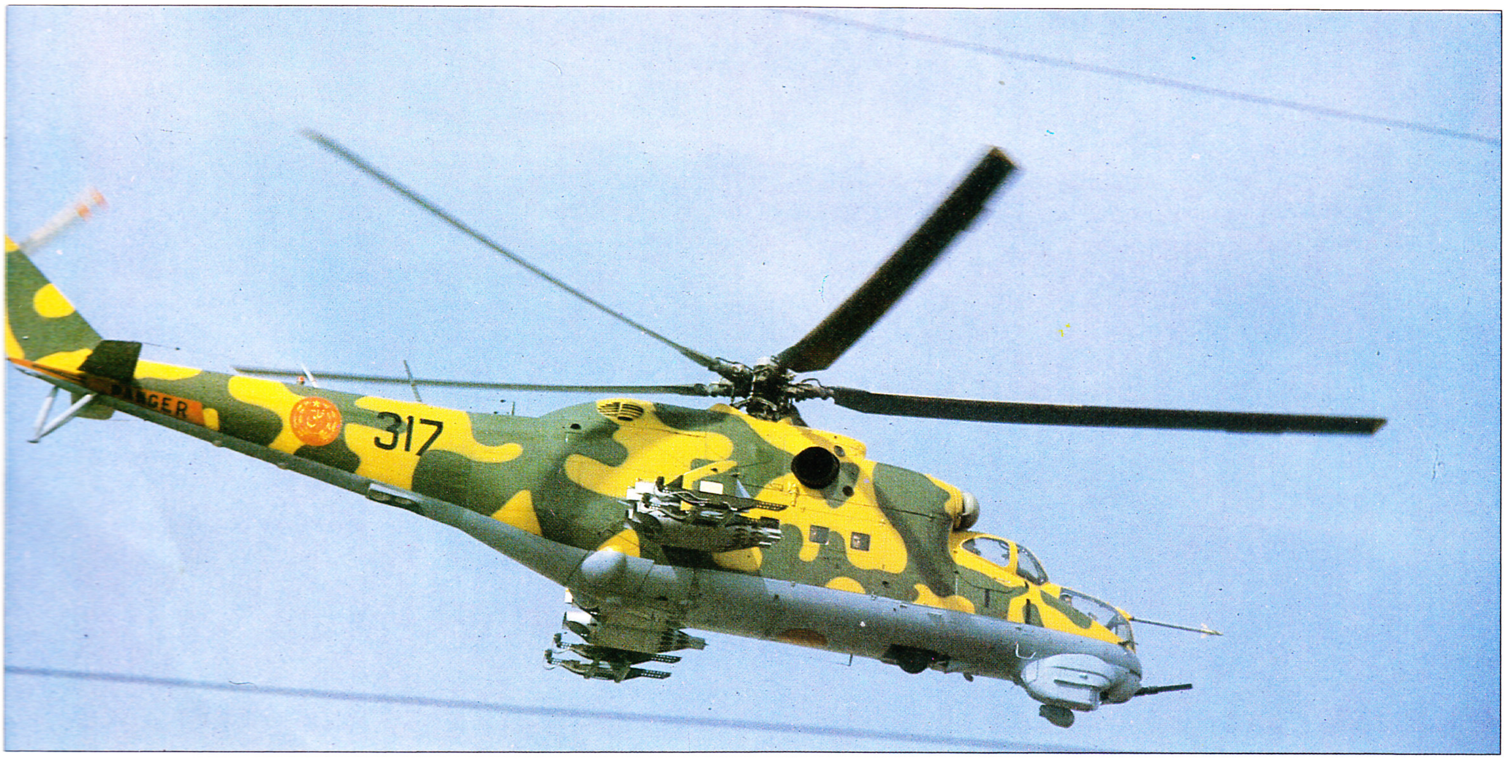
Partly armoured

What this first version does not have are full night and all-weather sensors, but it set the standard of basic design for the later members of the family. The basic dynamic parts are broadly similar to those of the Mi-8 except that the main rotor is much smaller (17 m/55 ft 9 in compared with 21.29 m/69 ft 10½ in diameter) and its five blades are of advanced composite steel/titanium/glassfibre construction to offer very high resistance to enemy fire. The engines are basically those of the Mi-17, more powerful than those of the Mi-8, and they are partly armoured and fitted with inlet particle-separators and special exhaust stacks to suppress IR radiation on which enemy SAMs could

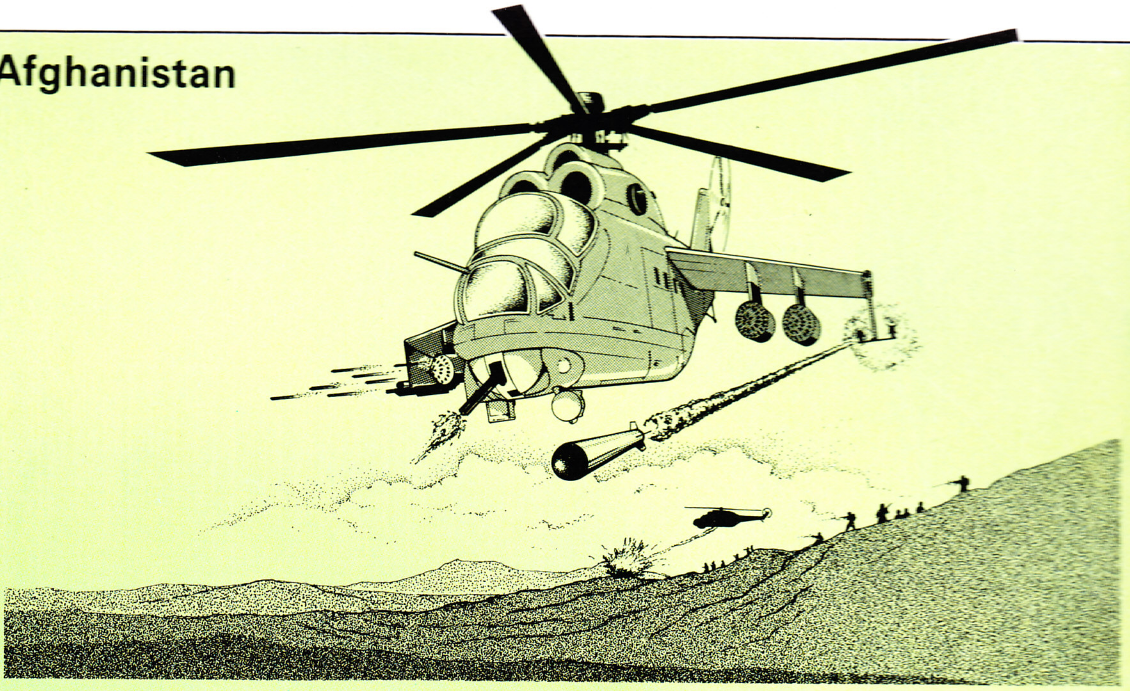


Presenting its most menacing aspect, this 'Hind-D' displays its twin cockpits, remotely controlled four-barrel gun, UV-32-57 rocket pods and rails for anti-tank missiles.

Certainly the best photograph yet to become available in the West of a gunship Mi-24, this shows a 'Hind-D' in Afghan colours with the main cabin occupied by troops.



'Hind' gunships in Afghanistan



The USSR is not used to fighting long wars; since 1945 it has been extremely careful either to gain its objectives by political ends or, by applying overwhelming force suddenly, as in Budapest during 1956 and in Prague during 1968, to crush all dissension in a matter of hours. In December 1979 the president of Afghanistan was murdered and the puppet government which 'took office' on the same day invited the USSR to crush opposition by bringing in small elements of the Russian army. The whole thing had been planned in advance, but what had been miscalculated was the determination of the Afghan people to resist. Despite a gigantic build-up of Russian military might the war in Afghanistan goes on.

From the start the Soviet FA (Frontal Aviation, or tactical air force) has played a major role in trying to eliminate all opponents of the new regime who dare to show themselves. A substantial part of the FA regiments now in Afghanistan are straightforward fixed-wing units whose main preoccupation has been punitive dive-bombing of Afghan towns and villages, of which more than 80 have been completely obliterated. Some have the close-support Sukhoi Su-25 'Frogfoot', which is well adapted to this style of warfare against ill-equipped ground forces, but the most numerous single type appears to be the Mil Mi-24 'Hind' armed helicopter, which was in Afghanistan on the day Soviet troops crossed the frontier.

Warfare in Afghanistan since 1979 has to a considerable degree resembled that in Algeria 20 years earlier in that it is a no-holds-barred struggle between a hardy but ill-equipped people and a major military power over rugged and completely undeveloped terrain. As in that former conflict it has been demonstrated repeatedly that, while aviation forces cannot actually occupy and rule an area as can ground troops, they can winkle out pockets of resistance which might otherwise make such occupation very costly. Many refugees from Afghanistan have insisted that the Mi-24, used in several versions including the modern tandem-seat gunships, are the most feared single weapon deployed by the Russian forces.

Such large and powerful (4,400 hp/3282 kW) machines broadcast their presence from a great distance, but the Afghans have hardly any effective anti-aircraft weapons. Both by day and night the Mi-24s continually succeed in pinning down even individual Afghans who are then captured by the helicopter's own infantry or by ground forces summoned by radio. All Mi-24s have at least one large-calibre gun in the nose, and the most effective single weapon is the four-barrel 12.7-mm (0.5-in) gun of the gunship 'Hind-D' and 'Hind-E' models. This has a very high rate of fire, is supplied with several thousand rounds of ammunition, and appears to be very accurate over ranges as great as 1000 m (1,095 yards). With a superb range of sensors, including complete magnifying night-vision systems, the Mi-24 cannot be evaded. A typical technique is to land eight troops from the main cabin, wait until their advance is checked by resistance and then mount a devastating assault with 57-mm (2.24-in) rockets or even anti-tank missiles (very effective against caves and rock crevices). So far as is known the large areas taken by troops flown in by Mi-24s have remained in Russian hands, largely because the Afghans formerly in possession no longer exist.

Not too much of the Afghan war reads across to a conflict between two major powers. In the latter event the helicopters would be quite unable to stand off at close range in full view of the enemy; indeed, several Mi-24s have been lost in Afghanistan apparently to accurate rifle fire. What this campaign has done is again to drive home the lesson that the heavily armed and armoured helicopter, carrying not only weapons but also a squad of assault troops, is the most potent single weapon in the COIN (counter-insurgency) type of warfare.

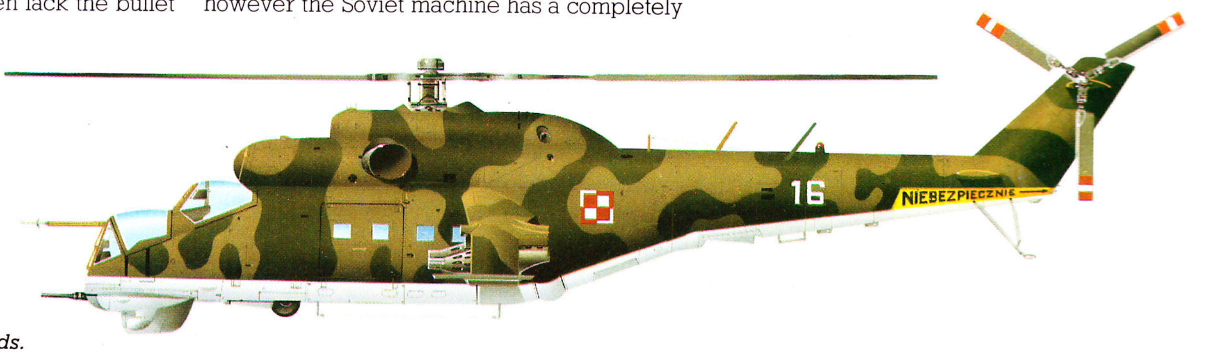
home. Many other crucial parts of the gearbox, shafting and flight-crew areas are protected by lightweight armour or specially robust (heavy titanium sheet, for example) airframe construction. Certainly it would be difficult to bring down an Mi-24 with guns of 20-mm calibre or smaller.

Later models

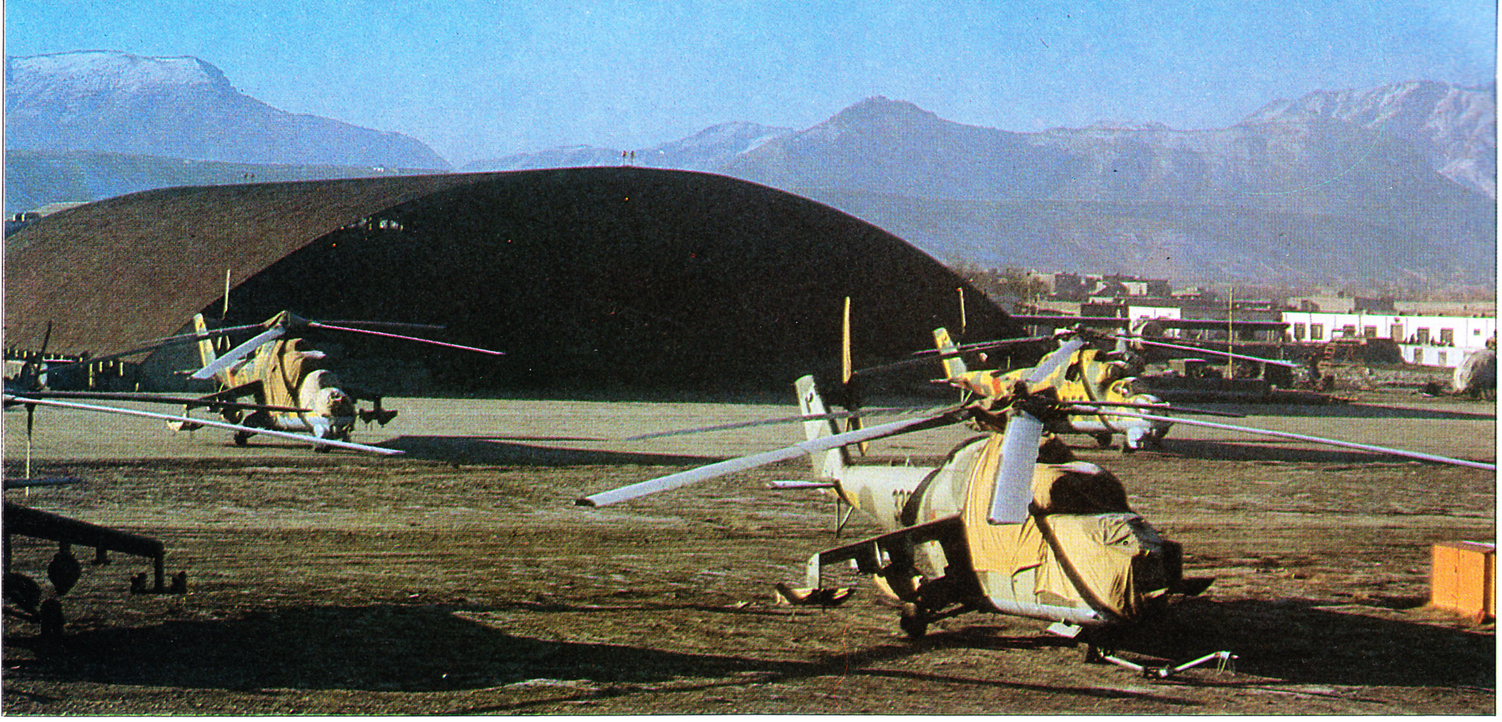
Other early models include the 'Hind-B' (actually the first variant to be built) with smaller weapon wings without anhedral and lacking the missile rails, and the 'Hind-C' without missiles or nose gun. The latter machine has the modified tail-rotor installation and so did not precede the 'Hind-A'; the reason for removal of most of the armament is unknown but may be in order to carry heavy slung loads. These partially stripped models often lack the bullet fairing at the top of the innermost weapon pylon on the left side which is either a laser tracker and ranger or, more probably, a TV-type electro-optical viewing system. It would be reasonable to suppose that this sensor is an image-enhancing type such as LLTV (low-light TV), and thus able to provide a picture of the ground at night or in some kinds of bad weather. On the other hand the later gunship Mi-24s retain this sensor whilst introducing several others.

Perhaps the most numerous of all versions, the 'Hind-D' retains the same airframe and cabin as before except that the four-seat cockpit is replaced by a new forward fuselage seating just two. As in the American Bell HueyCobra and Hughes Apache, the front seat is occupied by the weapon operator, the pilot being at a higher level to the rear. Unlike the US types, however the Soviet machine has a completely separate fighter-type canopy for each cockpit, the difference in level being such that the bottom of the pilot's windscreen is level with the top of the canopy in front. Both crew-members have a bulletproof windscreen with wiper, but whereas the pilot enters via a door on the right side the front-seater climbs in from the left with the complete canopy hinged open to the right. Bulletproof qualities of the canopies are not known, but there is extensive armour around the lower parts of both cockpits.

Around the nose are extensive all-weather sensors and weapon-aiming systems, some of which can clearly be slaved to the new gun turret under the nose. The gun is unknown in the West but is a rapid-fire four-barrel weapon



Another 'Hind-D', in this case deployed by the PWL (Polish air force). The long rod projecting ahead of the nose is an air-data sensor, which is particularly important in permitting precise aiming of weapons at all airspeeds.



'Hind' gunships deployed in Afghanistan. Two are very fully protected by large, well-tailored covers over the cockpits, weapons, rotor hubs, tail-rotor blades and engines. Such cosseting is rare in the West.

of estimated 12.7-mm (0.5-in) calibre. Sensors are housed in numerous small and large blisters and probably include a radar, LLTV and (despite claims that the USSR had not developed such devices, notwithstanding the fact that they have been displayed in public) a FLIR (forward-looking IR) system. A long boom ahead of the nose incorporates a precision true-airspeed sensor for providing essential data for weapon-aiming. There are several variations on the weapon and sensor fit, most gunship models having the original (probably electro-optical) pod moved to the tip of the left weapon sponson and a version called 'Hind-E' having different missile installations matched to the tube-launched AT-6 'Spiral' missile which is believed to feature laser homing.

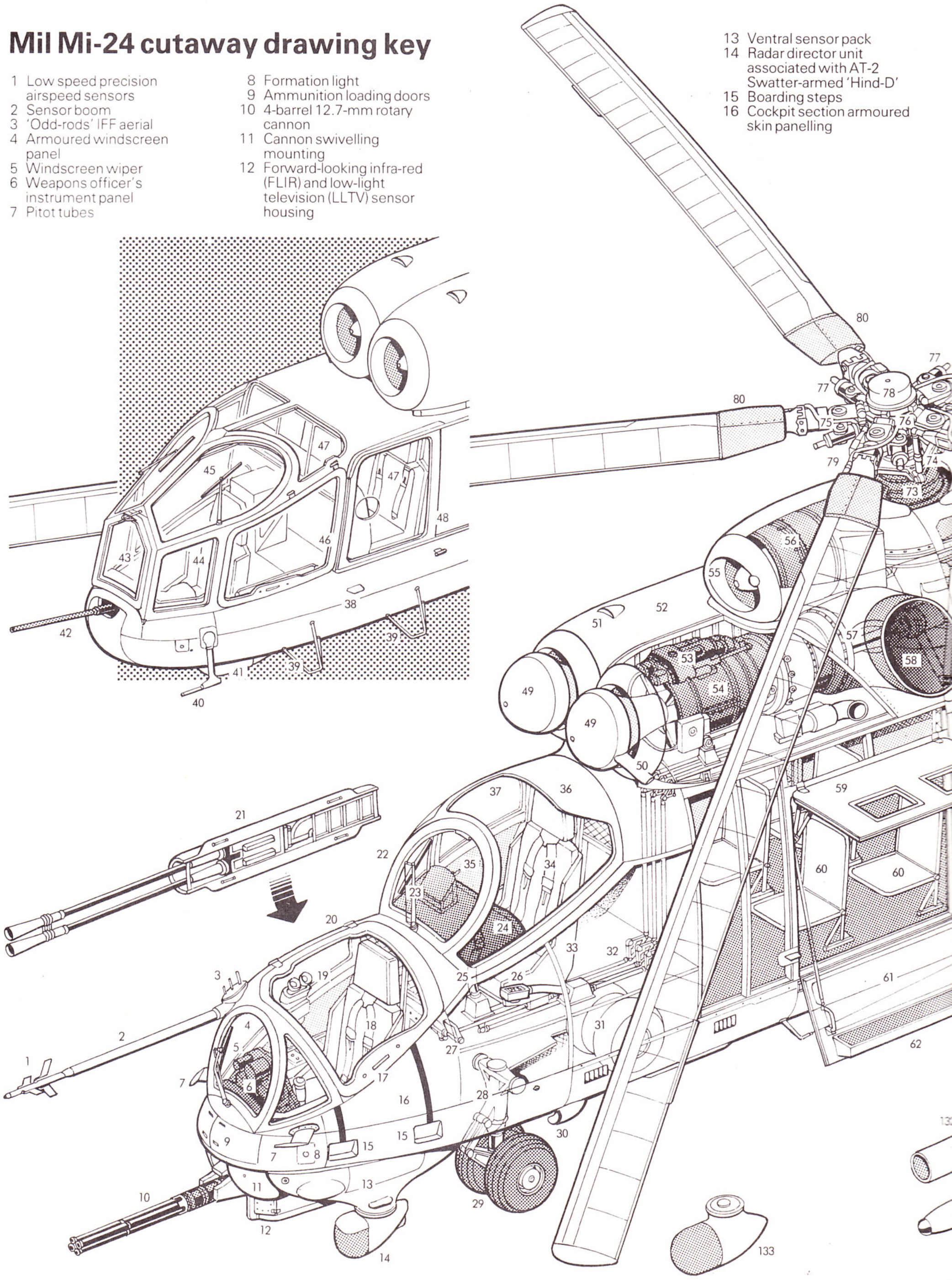
Action in Afghanistan

Latest of the many variants, and not yet allocated an announced NATO designation, is a gunship with a smooth streamlined nose devoid of the gun turret. Instead a long package on the right side below the pilot's door contains a GSh-23 twin-barrel cannon, which is aimed as in fighter aircraft by the pilot steering the whole machine. This version has a slightly different sensor fit, but all the recent Mi-24 versions appeared to have as many as 13 major avionic aerials and unidentified bulges, suggesting an extremely comprehensive array of sensors for every conceivable purpose.

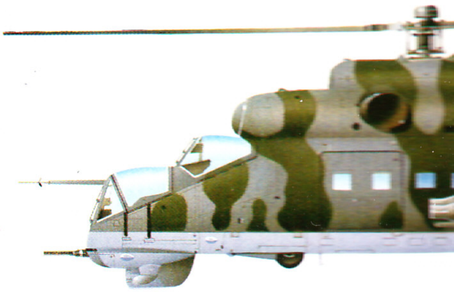
By mid-1983 an estimated 1,240 of all versions of Mi-24 had been delivered, with production continuing at about 15 per month. Large numbers have been in action in Afghanistan, where they have proved devastating to Afghans who lack SAMs, aircraft, and (in most regions) even weapons of larger than rifle calibre. Yet several Mi-24s have been shot down, in at least one case to carefully aimed rifle fire. The suppression of Afghan resistance has not been particularly helpful to the USSR's refinement of tactical procedures, where the Mi-24's performance against other helicopters and close-support aeroplanes has yet to be demonstrated.

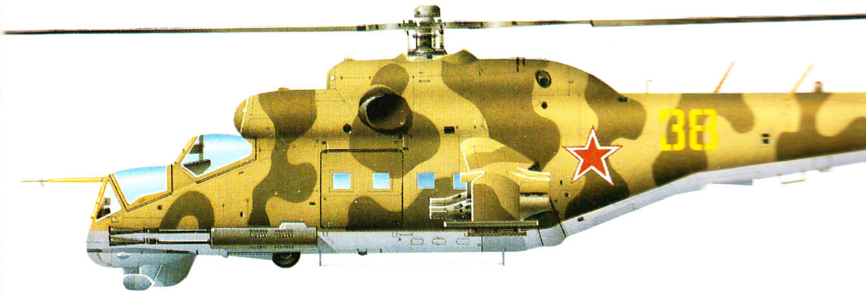
Mil Mi-24 cutaway drawing key

1 Low speed precision airspeed sensors
2 Sensor boom
3 'Odd-rods' IFF aerial
4 Armoured windscreen panel
5 Windscreen wiper
6 Weapons officer's instrument panel
7 Pitot tubes
8 Formation light
9 Ammunition loading doors
10 4-barrel 12.7-mm rotary cannon
11 Cannon swivelling mounting
12 Forward-looking infra-red (FLIR) and low-light television (LLTV) sensor housing
13 Ventral sensor pack
14 Radar director unit associated with AT-2 Swatter-armed 'Hind-D'
15 Boarding steps
16 Cockpit section armoured skin panelling



Probably the most numerous of all Mi-24 versions, 'Hind-D' is one of three gunship models which all retain the eight-seat cabin amidships (which can be used for reload missiles). This example serves with the LSK (East German air force).





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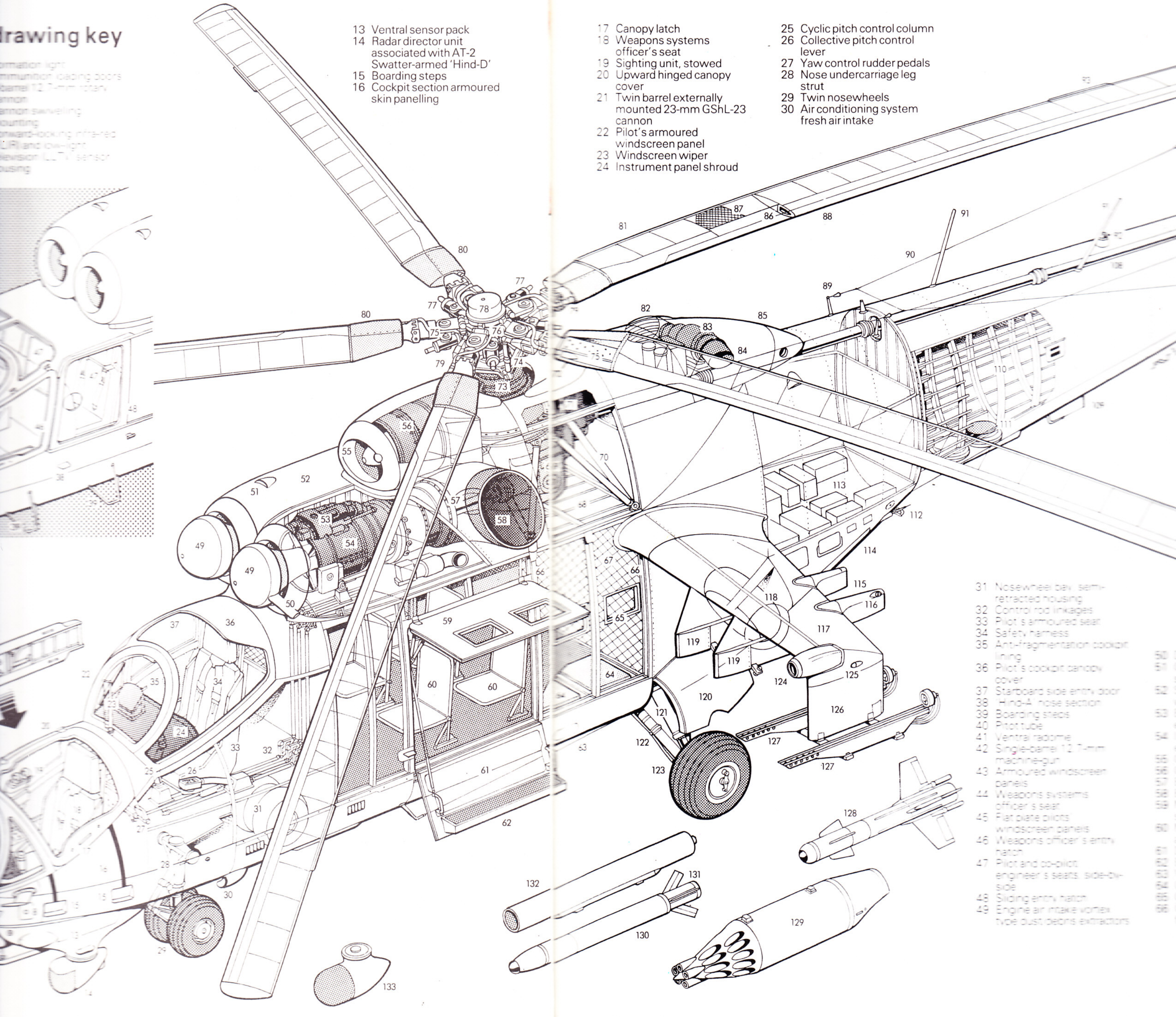
15 Boarding steps
16 Cockpit section armoured skin panelling
17 Canopy latch
18 Weapons systems officer's seat
19 Sighting unit, stowed
20 Upward hinged canopy cover
21 Twin barrel externally mounted 23-mm GShL-23 cannon
22 Pilot's armoured windscreen panel
23 Windscreen wiper
24 Instrument panel shroud
25 Cyclic pitch control column
26 Collective pitch control lever
27 Yaw control rudder pedals
28 Nose undercarriage leg strut
29 Twin nosewheels
30 Air conditioning system fresh air intake
31 Nosewheel bay, semi-retracted housing
32 Control rod linkages
33 Pilot's armoured seat
34 Safety harness
35 Anti-fragmentation cockpit lining
36 Pilot's cockpit canopy cover
37 Starboard side entry door
38 'Hind-A' nose section
39 Boarding steps
40 Pitot tube
41 Ventral radome
42 Single-barrel 12.7-mm machine-gun
43 Armoured windscreen panels
44 Weapons systems officer's seat
45 Flat plate pilots' windscreen panels
46 Weapons officer's entry hatch
47 Pilot and co-pilot/engineer's seats, side-by-side
48 Sliding entry hatch
49 Engine air intake vortex type dust/debris extractors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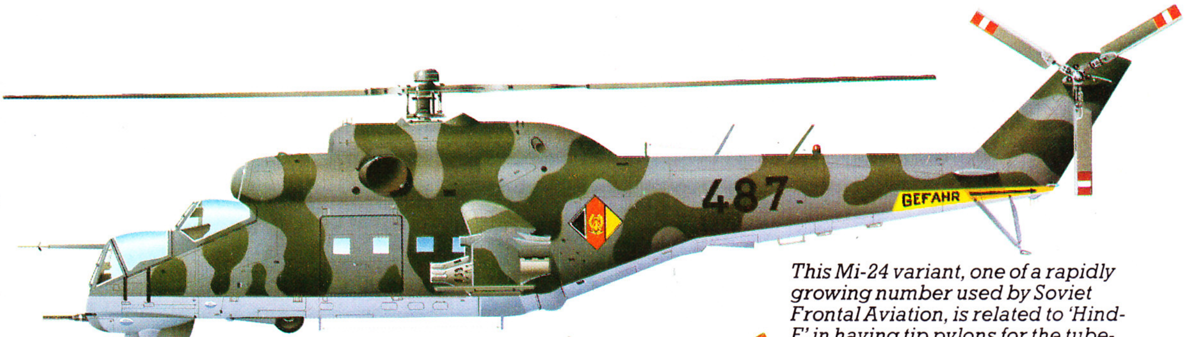
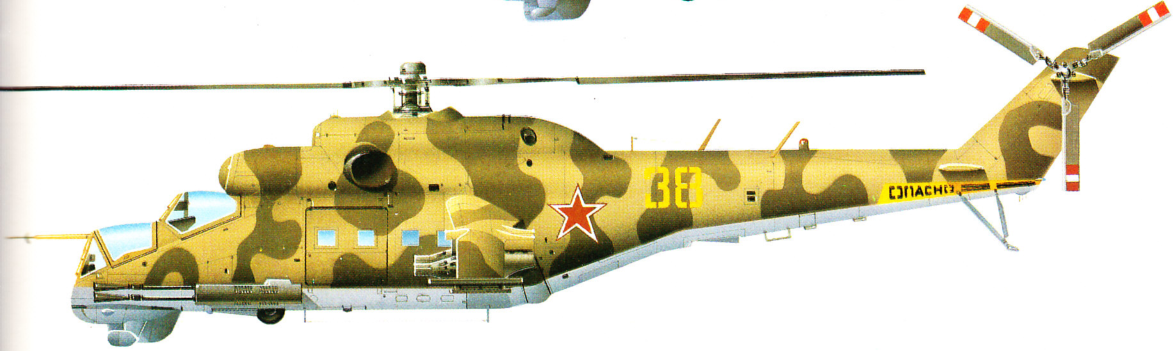
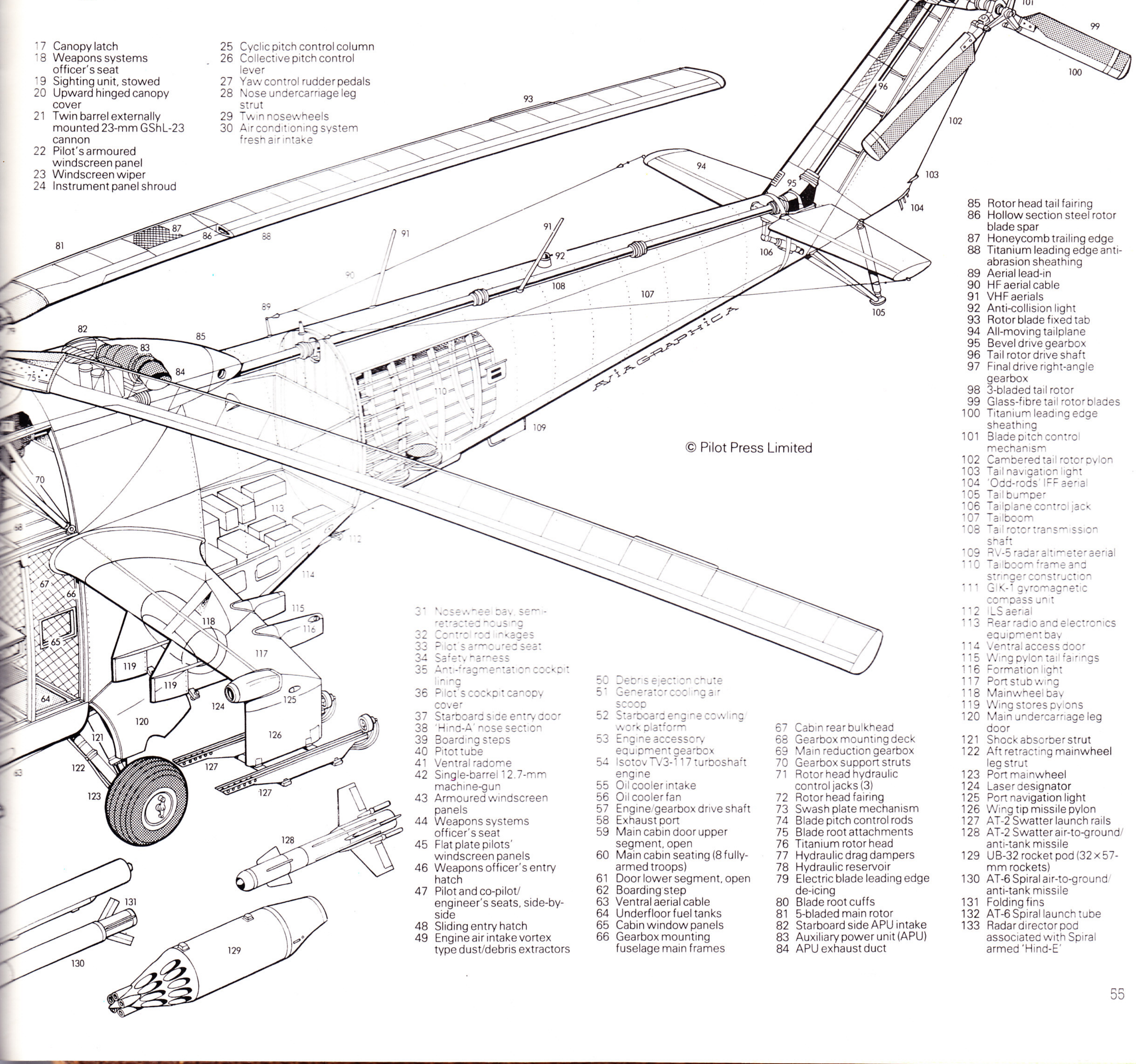




This Mi-24 variant, one of a rapidly growing number used by Soviet Frontal Aviation, is related to 'Hind-E' in having tip pylons for the tube-launched AT-6 'Spiral' missile. Like several new models, the chin turret is replaced by a GSh-23 twin-barrel gun.



17 Canopy latch
18 Weapons systems officer's seat
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47 Pilot and co-pilot/engineer's seats, side-by-side
48 Sliding entry hatch
49 Engine air intake vortex type dust/debris extractors
50 Debris ejection chute
51 Generator cooling air scoop
52 Starboard engine cowling/work platform
53 Engine accessory equipment gearbox
54 Isotov TV3-117 turboshaft engine
55 Oil cooler intake
56 Oil cooler fan
57 Engine/gearbox drive shaft
58 Exhaust port
59 Main cabin door upper segment, open
60 Main cabin seating (8 fully-armed troops)
61 Door lower segment, open
62 Boarding step
63 Ventral aerial cable
64 Underfloor fuel tanks
65 Cabin window panels
66 Gearbox mounting fuselage main frames
67 Cabin rear bulkhead
68 Gearbox mounting deck
69 Main reduction gearbox
70 Gearbox support struts
71 Rotor head hydraulic control jacks (3)
72 Rotor head fairing
73 Swash plate mechanism
74 Blade pitch control rods
75 Blade root attachments
76 Titanium rotor head
77 Hydraulic drag dampers
78 Hydraulic reservoir
79 Electric blade leading edge de-icing
80 Blade root cuffs
81 5-bladed main rotor
82 Starboard side APU intake
83 Auxiliary power unit (APU)
84 APU exhaust duct
85 Rotor head tail fairing
86 Hollow section steel rotor blade spar
87 Honeycomb trailing edge
88 Titanium leading edge anti-abrasion sheathing
89 Aerial lead-in
90 HF aerial cable
91 VHF aerials
92 Anti-collision light
93 Rotor blade fixed tab
94 All-moving tailplane
95 Bevel drive gearbox
96 Tail rotor drive shaft
97 Final drive right-angle gearbox
98 3-bladed tail rotor
99 Glass-fibre tail rotor blades
100 Titanium leading edge sheathing
101 Blade pitch control mechanism
102 Cambered tail rotor pylon
103 Tail navigation light
104 'Odd-rods' IFF aerial
105 Tail bumper
106 Tailplane control jack
107 Tailboom
108 Tail rotor transmission shaft
109 RV-5 radar altimeter aerial
110 Tailboom frame and stringer construction
111 GIK-1 gyromagnetic compass unit
112 ILS aerial
113 Rear radio and electronics equipment bay
114 Ventral access door
115 Wing pylon tail fairings
116 Formation light
117 Port stub wing
118 Mainwheel bay
119 Wing stores pylons
120 Main undercarriage leg door
121 Shock absorber strut
122 Aft retracting mainwheel leg strut
123 Port mainwheel
124 Laser designator
125 Port navigation light
126 Wing tip missile pylon
127 AT-2 Swatter launch rails
128 AT-2 Swatter air-to-ground/anti-tank missile
129 UB-32 rocket pod (32 × 57-mm rockets)
130 AT-6 Spiral air-to-ground/anti-tank missile
131 Folding fins
132 AT-6 Spiral launch tube
133 Radar director pod associated with Spiral armed 'Hind-E'

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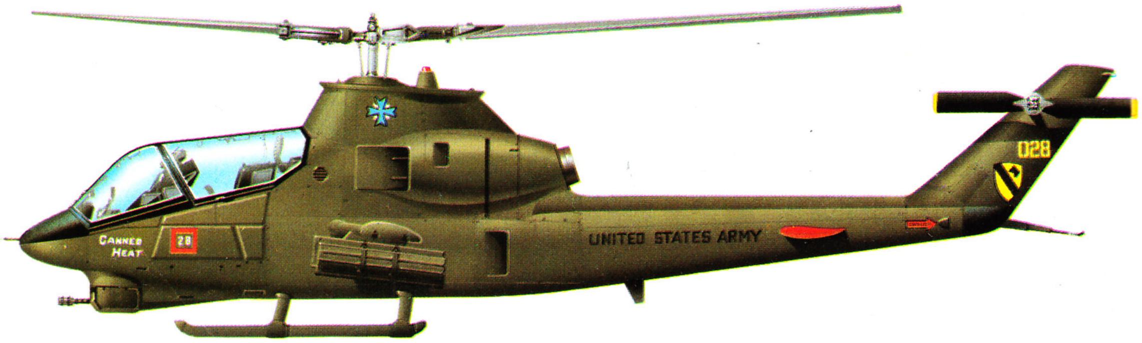
USA

Bell 209 HueyCobra

The **Bell Model 209** was developed as an urgent company-funded programme to provide a cheaper alternative to the problem-ridden Lockheed AH-56A, and once the prototype had flown on 7 September 1965 its future was assured. The project arose from the US Army's experience in Vietnam during the first half of the 1960s. Experience had shown both the utility and the vulnerability of the conventional helicopter for tactical transport, and it was rapidly appreciated that the optimum means of escorting and supporting such helicopters was with an agile, armoured and armed helicopter, in fact a gunship helicopter. Based on the Model 204, the Model 209 had a new slim fuselage with a fighter-type cockpit for the pilot high in the rear and a co-pilot/gunner lower in the front directing the fire of a wide range of weapons mounted on lateral stub wings or under the nose. The **AH-1G HueyCobra** went into production in 1966 and over 1,000 were delivered in the first four years. Powered by a 1,400-shp (1044-kW) T53, the AH-1G saw extensive service in Vietnam. Many were converted as **TH-1G** dual-control trainers. The **AH-1J SeaCobra** was the first twin-engine version, for the US Marine Corps, with an 1,800-shp (1343-kW) T400 installation; in 1974-5 a batch of 202 with TOW missiles was supplied to Iran. The **AH-1Q** was an interim US Army version adapted from AH-1G helicopters with TOW missiles, while the **AH-1R** has the 1,800-shp (1343-kW) T53-703 engine, but no provision for the TOW missile. The current US Army model is the AH-1S, produced in four successively improved stages: (the **Modified AH-1S** produced by conversion of AH-1Gs with the 1,800-shp/1342-kW T53-703, TOW missiles and an upgraded rotor system; the **Production AH-1S** similar to the Modified AH-1S but with flat-plate canopy and improved avionics/instrumentation; the **Up-gun AH-1S** based on the Production AH-1S but with superior stores-management system and provision for a universal turret capable of accepting a variety of 20-mm and 30-mm cannon; and the **Modernized AH-1S** with all the previous improvements and IR suppression of the exhausts (to reduce the type's vulnerability to IR-homing missiles) ending with flat-plate canopies. TOW missiles and over 80 new or improved items of avionics and equipment for all-weather flying at almost ground level. The current USMC model is the **AH-1T Improved SeaCobra** with longer fuselage, TOW missiles and 1,970-shp (1470-kW) T400 engine group. One AH-1T has twin T700-700 engines of 3,200 shp (2387 kW) and it is proposed to retrofit the USMC force with the T700-401 giving no less than 3,380 shp (2521 kW).



This was the original configuration of the AH-1G HueyCobra, with a single T53 engine, curved canopy and M28 armament subsystem with a Minigun and 40-mm grenades.

Specification

Bell AH-1S

Type: anti-armour attack helicopter

Accommodation: pilot and co-pilot/gunner

Armament: eight TOW missiles on outboard wing points, with pods inboard housing groups of 7 or 19 of any of five types of 69.9-mm (2.75-in) rocket; General Electric turret under nose with M197 20-mm three-barrel gun (alternatives are 30-mm gun or combined 7.62-mm/0.3-in Minigun plus 40-mm grenade-launcher)

Powerplant: one 1,800-shp (1343-kW) Avco Lycoming T53-703 turboshaft

Performance: maximum speed varies from 333 km/h (207 mph) to 227 km/h (141 mph) depending on equipment fit; range at sea level with maximum fuel and 8 per cent reserves 507 km (315 miles)

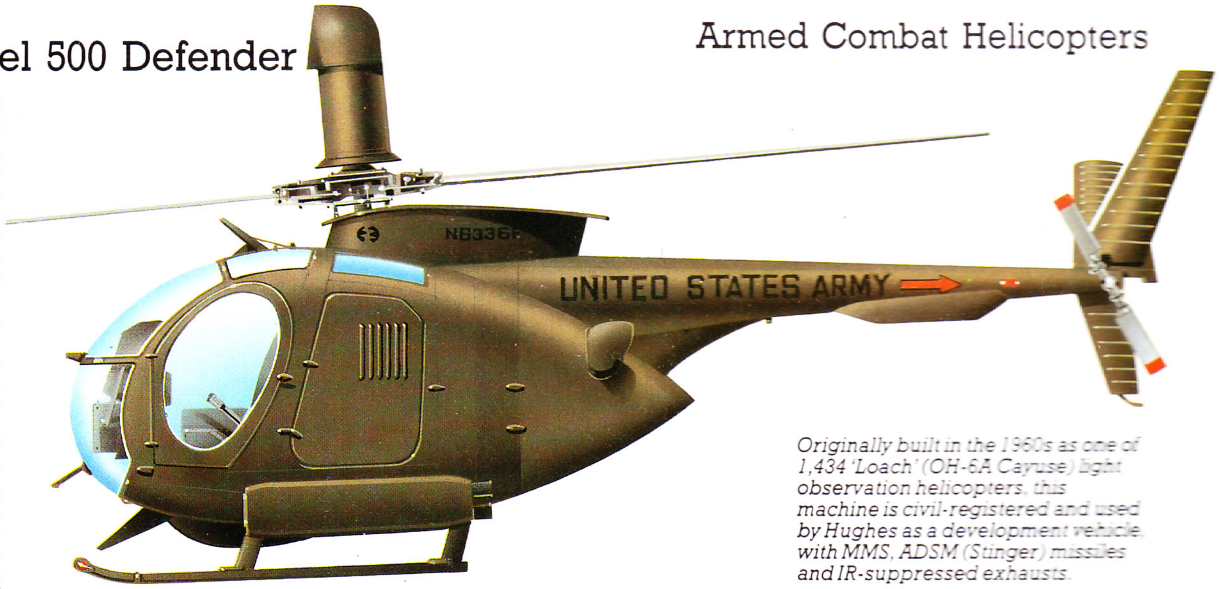
Weights: empty 2939 kg (6,479 lb); maximum take-off 4535 kg (10,000 lb)

Dimensions: main rotor diameter 13.41 m (44 ft 0 in) or, in AH-1T family, 14.63 m (48 ft 0 in); fuselage length 13.59 m (44 ft 7 in) or, in AH-1T, 14.68 m (48 ft 2 in); height over tail rotor 4.12 m (13 ft 6¼ in); main rotor disc area 141.26 m² (1,520.5 sq ft) or, in AH-1T, 168.1 m² (1,809.6 sq ft)

Rotor downwash breaks up the motor smoke trail of a missile fired by one of a formation of US Marine Corps AH-1T SeaCobras on an assault exercise. These are twin-engined and have the triple-barrel GE M197 cannon in an under-nose turret.

USA

Hughes Model 500 Defender



Originally built in the 1960s as one of 1,434 'Loach' (OH-6A Cayuse) light observation helicopters, this machine is civil-registered and used by Hughes as a development vehicle, with MMS, ADSM (Stinger) missiles and IR-suppressed exhausts.

In 1965 the US Army held an LOH (Light Observation Helicopter) contest, with potential production for a four-figure total. When the **Hughes OH-6A Cayuse** won there was a storm of protest, it being claimed the company was selling below cost. Despite this, 1,415 OH-6s gave splendid service in Vietnam, and as its tadpole shape was extremely compact, and performance on a 317 shp (236-kW) Allison engine the highest in its class, the OH-6 was most popular. From it the company developed the **Hughes Model 500** family, the company astutely seeing the considerable market for a versatile, high-performance military helicopter of low cost and proven reliability. The basic **Model 500M** with improved 317-shp (236-kW) engine was sold to nine countries and licence-made in Argentina and Japan. Operated by Spain as a light anti-submarine platform, the Model 500M has AN/ASQ-81 magnetic anomaly detection (MAD) gear with a towed 'bird', and provision for two Mk 44 torpedoes. The **Model 500MD Defender** has the more powerful Allison 250-C20B engine and can have self-sealing tanks, inlet particle filter, IR-suppressing exhausts, and many role fits including seven seats, or two stretchers and two attendants, or various weapons, including the TOW anti-tank missile and nose-mounted sight. Licensed production proceeds at BredaNardi (Italy) and KAL (South Korea), and the type is in worldwide service for training, command and control, light attack, observation, logistic support, troop transport and ASW. The **Model 500MD Scout Defender** is the basic armed version (with a baseline fit of 14 2.75-in/70-mm rockets plus one 7.62-mm/0.3 in Minigun with 2,000 rounds, or one 7.62-mm/0.3-in EX-34 Chain Gun with 2,000 rounds, or one 30-mm Chain Gun with 600 rounds, or one 40-mm grenade-launcher) and a sub-type (**Model 500MD Quiet Advanced Scout Defender**) has the MMS (mast-mounted sight) for 'hull-down' surveillance or missile guidance, and quiet-running features. The **Model 500MD/TOW Defender** has four TOW missiles, original deliveries having a stabilized nose sight. The **Model 500MD Defender II** is an updated multi-role model now being delivered with quiet rotors (including a five- rather than four-blade main unit), MMS, IR suppression, FLIR (forward-looking IR) night vision and many other devices including APR-39 passive radar warning. This model can carry two Stinger air-to-air missiles, indicating the way in which the helicopter is becoming an air-to-air weapon, and that the company is keeping more than abreast of developments with this classic light helicopter.

Specification

Hughes Model 500MD Defender

Type: multi-role combat helicopter

Accommodation: two

Armament: options include Hughes 30-mm Chain Gun (firing rate reduced to 350 rounds per minute), four TOW missiles and two Stinger MLMS AAMs

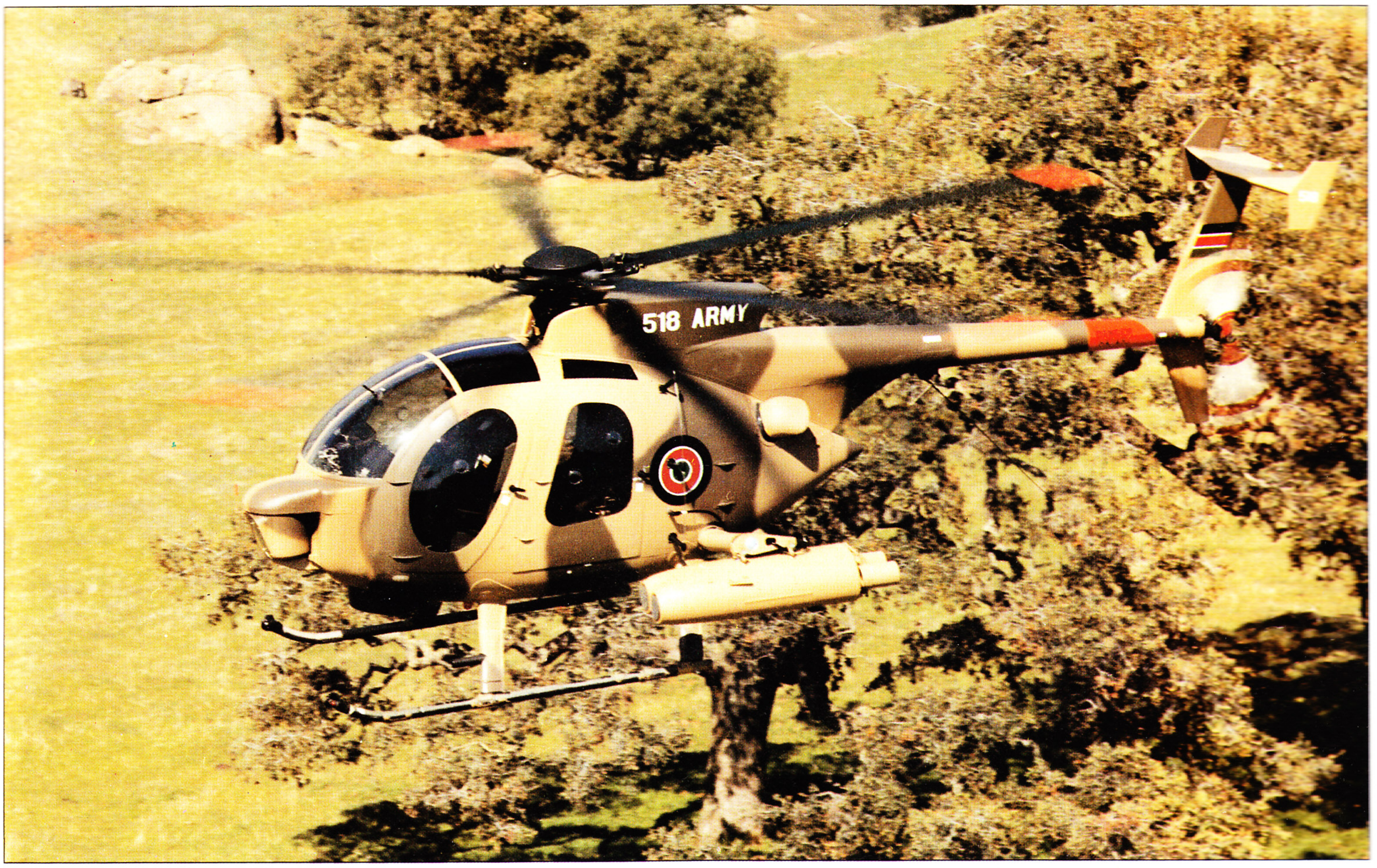
Powerplant: one 420-shp (313-kW) Allison 250-C20B turboshaft

Performance: maximum speed 217 km/h (152 mph); range 509 km (366 miles)

Weights: empty typically 572 kg (1,260 lb); maximum take-off 1361 kg (3,000 lb)

Dimensions: main rotor diameter 8.05 m (26 ft 4¾ in); fuselage length 7.01 m (23 ft 0 in); height 2.71 m (8 ft 10¾ in); main rotor disc area 50.7 m^2 (546.0 sq ft)

Kenya is one of many customers worldwide for the Hughes 500MD Defender family, this example having a nose-mounted sight installation to direct the fire of four TOW anti-tank guided missiles.



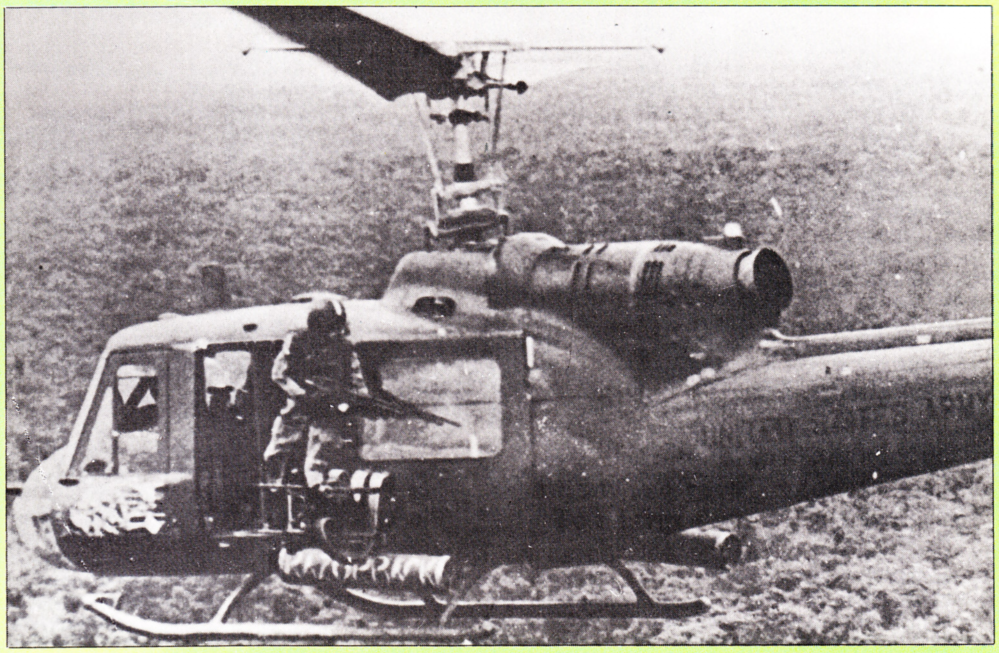
Helicopter gunships in Vietnam

Large Luftwaffe Focke-Achgelis Fa 223 transport helicopters invariably had a hand-aimed machine-gun in their glazed nose, and in Korea many Sikorsky H-19s had seven tandem rocket launch-tubes bolted on each side of the fuselage to fire straight ahead. In Algeria in 1956-63 the French took the concept of the armed tactical helicopter much further, developing in the harsh school of war new ways to use helicopters armed with machine-guns, cannon, rockets and wire-guided missiles. In 1957 Colonel Jay D. Vanderpool of the US Army formed the first highly experimental American platoon of armed helicopters, but it took five years for a regular company to be formed. In Vietnam in 1962 this proved so useful in providing mobile firepower that it won over the doubters. Spurred by the vision of Lieutenant General Hamilton Howze, US Army, the concept of a helicopter built solely to carry armament gradually matured in 1962-3. In the latter year Bell privately built the small Model 207 Sioux Scout, a streamlined Bell 47 with a chin turret, and this led quickly to the machine the USA had been waiting for, the Model 209 HueyCobra. The first of these flew as a company-financed prototype in September 1965, and it mated the wide-blade 'door hinge' rotor of the UH-1C Huey with a new slim fuselage just wide enough for tandem cockpits for a co-pilot/gunner in the nose and a pilot at a higher level behind the gunner. This was the first effective gunship, designed to fly like a fixed-wing fighter whilst carrying sensors, aiming systems and a variety of weapons either aimed from a chin turret or fired from stub wings on each side.

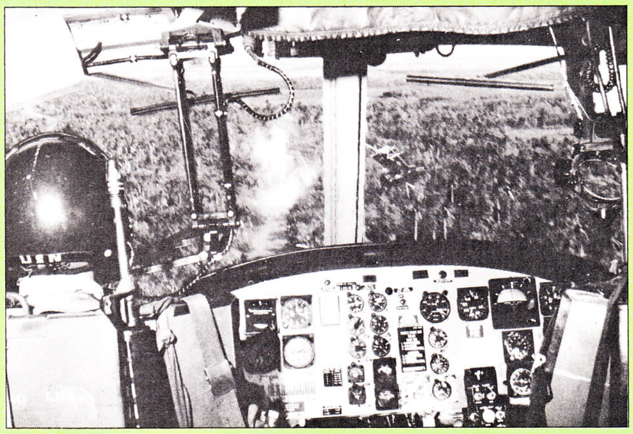
Production of this AH-1G was immediately put in hand on the largest possible scale, and in Vietnam the type multiplied the effectiveness of a wide range of missions. The US Army got the AH-1 only after a bitter political battle with the USAF, which claimed a monopoly of tactical combat aircraft. In fact the USAF had never been able to provide a single such aircraft tailored to the tasks of escorting troop-carrying helicopters or keeping enemy heads down as such machines were arriving at an LZ (landing zone). Later AH-1 helicopters received powerful anti-armour weapons, but early examples had armament for use against infantry. The Emerson TAT-102 chin turret was fitted with an M134 rapid-fire Minigun, and various guns including M134s could be bolted on the sides. By 1968 the usual chin turret was Emerson's M28 with two weapon positions either of which could be occupied by an M134 with 4,000 rounds or an M129 launcher with 300 grenades of 40-mm (1.57-in) calibre. Side arms included many rocket pods, cannon pods and special launchers.

In the final four years of the Vietnam war (1968-72) the land battles saw important use of three types of USA helicopter, the UH-1 'Huey', the AH-1 Cobra (called the 'Snake'), and the Hughes OH-6A Cayuse (called the 'Loach' from its original designation LOH). All operated together. Each US Army division usually had an 'air cavalry' troop made up of a 1st Platoon (Aero Scouts) whose Snakes and Loaches would carefully reconnoitre the country around a hostile ground force and mark a chosen LZ, a 2nd Platoon (Lift) with Hueys for transport of troops and supplies, a 3rd Platoon (Weapons) with Cobras, and a 4th Platoon (ARP, meaning Aero Rifle Platoon) bringing infantry with Hueys. Over 600,000 hours were flown by the Cobras, Loaches and a few armed Hueys in the closest proximity to the enemy, whose anti-aircraft capabilities increased all the time. The close team of Cobras (Snakes) and Loaches used seven communications radios, laser beams, 14 coloured pyrotechnics, air-dropped radio beacons and special sensors in their unprecedented tasks within a few metres of hostile troops. Constant agility was vital, and the likelihood of taking strikes from ground fire on each mission often exceeded 60 per cent. Casualties were inevitably heavy, but an amazing number of Cobra crews were recovered. Captain Hugh Mills flew 3,300 hours in 1,019 combat Snake missions, in the course of which he was shot down 16 times – certainly a record for any helicopter pilot.

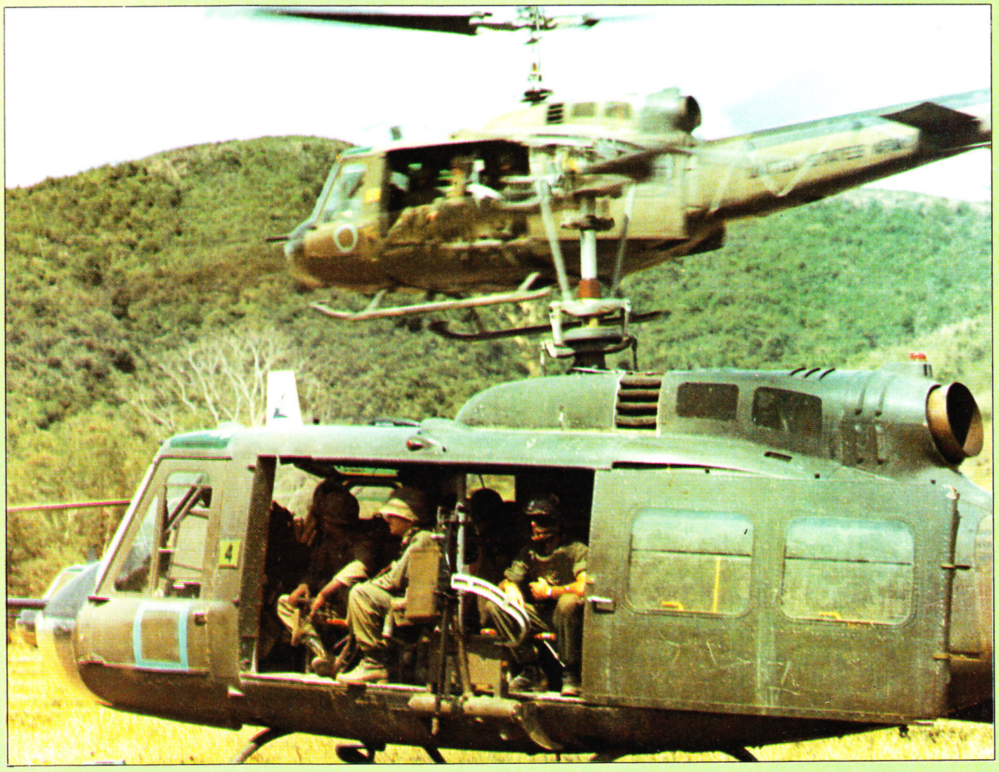
By 1970 SMASH (Southeast Asia Multi-sensor Armament System for HueyCobra) was in action, with high-resolution radar with MTI (moving-target indication) and passive IR receiver to give superior vision at night or in adverse weather. SMASH Snakes operated with groups of others using high-intensity Xenon searchlights, batteries of Lockheed C-130 landing lights and Starlight Scopes (image intensifiers). By July 1972 kills were being registered with the new TOW missile.



Above: UH-1B Huey in action in South Vietnam. It is fitted with two seven-tube rocket launchers, and four 7.62-mm M60 machine-guns are fixed to fire forwards. Here another M60 is aimed to the rear.



Right: Looking ahead from a Bell UH-1B Iroquois (62-12515), operated by Detachment 7 of Light Helicopter Attack Squadron 3, US Navy. A firing run is being made on a Viet Cong sampan.



Below: The UH-1D offered much greater cabin volume than previous Huey versions, with room for up to 14 troops. Here the large side door is slid aft for aimed fire with M60s.

Above: One of the numerous UH-1B Hueys built for the US Army but transferred to the Navy in South East Asia. This model has the short cabin and single T53 engine.

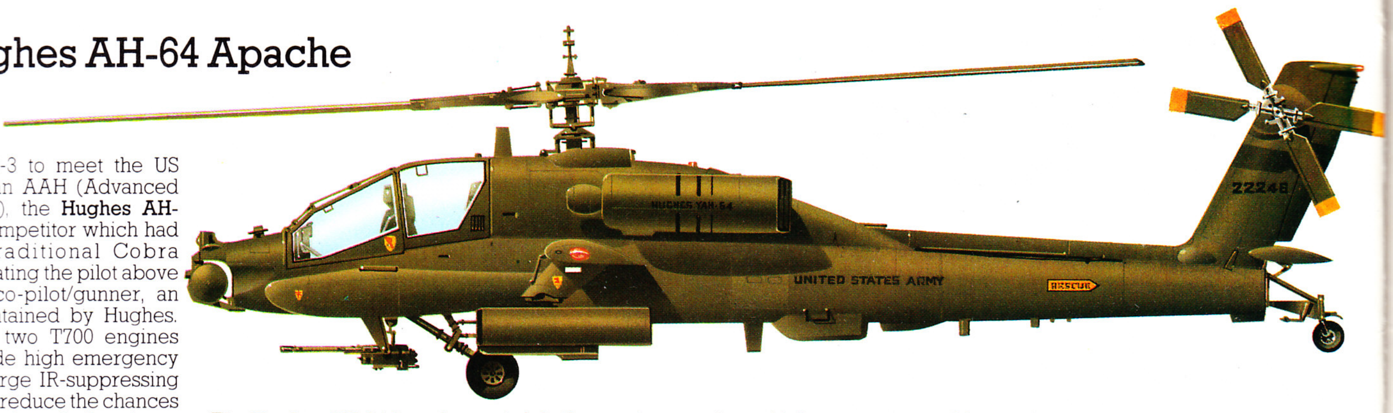
Above: Many of the early AH-1G HueyCobra gunship helicopters in Vietnam were painted with shark's teeth. This example may have been fitted with a replacement M28 chin turret, because the turret was usually painted red.

Above: A 7.62-mm (0.3-in) Browning is the gun being used by a gunner through the open doorway of a UH-1D in Vietnam. Such defence-suppression fire was a necessary preliminary to the delivery of troops in disputed areas.

Below: With loaded side armament and a full complement of troops, a unit of Bell UH-1 assault transports prepares for lift-off and rapid transit to the designated landing zone.

USA

Hughes AH-64 Apache



The Hughes AH-64 Apache, certainly the most expensive vehicle ever proposed for use in a land battle.

Designed in 1972-3 to meet the US Army's need for an AAH (Advanced Attack Helicopter), the **Hughes AH-64A** beat a Bell competitor which had reversed the traditional Cobra arrangement of seating the pilot above and behind the co-pilot/gunner, an arrangement maintained by Hughes. Features include two T700 engines flat-rated to provide high emergency power and with large IR-suppressing exhaust systems to reduce the chances of a hit by an IR-homing missile, a large flat-plate canopy with boron armour, multi-spar stainless steel and glassfibre rotor blades designed to withstand 23-mm hits, extremely comprehensive avionics and weapon fits, and numerous crash-resistant features to protect the crew. All these features are vital in a combat helicopter designed to undertake the most arduous of battlefield roles by day and night, and even under the most adverse of weather conditions. Development was unfortunately prolonged, the first prototype flying on 30 September 1975 and the programme being hard hit by modification, so that inflation has multiplied the price and not all the planned 536 Apaches may be funded. Appearance changed dramatically during development, especially at the nose and tail, and the nose carries the Martin Marietta TADS/PNVS (Target Acquisition and Designation Sight/Pilot's Night Vision System). New missiles have become available, and as well as laser designation and ranging an IHADSS (Integrated Helmet And Display Sighting System) is fitted, both crew members being able to acquire targets by head movement. The type is due to enter service late in 1983, and procurement has already been sent back to 446 units. There can be little doubt as to the technical excellence and ingenuity represented by the **AH-64A Apache**, but even the most enthusiastic supporter of the type must have grave reservations about the location of the sensor package in the nose rather than above the rotor, as this means the type has to leave cover to acquire targets, and is thus very vulnerable.

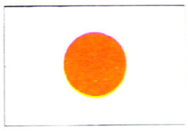
Specification

Hughes AH-64A Apache

Type: armed battlefield helicopter
Accommodation: pilot and co-pilot/gunner
Armament: one 30-mm Hughes Chain Gun with 1,200 rounds and remote aiming; four stub-wing hardpoints for normal anti-armour load of 16 Hellfire missiles (initially with laser guidance); other loads can include four 18-round pods of 2.75-in (70-mm) rockets
Powerplant: two 1,536-shp (1146-kW) General Electric T700-700 turboshafts
Performance: maximum speed (at 6316 kg/13,925 lb) 309 km/h (192 mph); range (internal fuel) 611 km (380 miles), and (ferry) 1804 km (1,121 miles)
Weights: empty 4657 kg (10,268 lb); maximum take-off 8006 kg (17,650 lb)
Dimensions: main rotor diameter 14.63 m (48 ft 0 in); fuselage length 14.97 m (49 ft 1½ in); height 4.22 m (13 ft 10 in); main rotor disc area 168.11 ^{2} (1,809.5 sq ft)

Air Vehicle 06, last of the development prototypes, hovering practically at ground level. The AH-64 is the most sophisticated of all battlefield helicopters, and probably the most survivable.

Japan



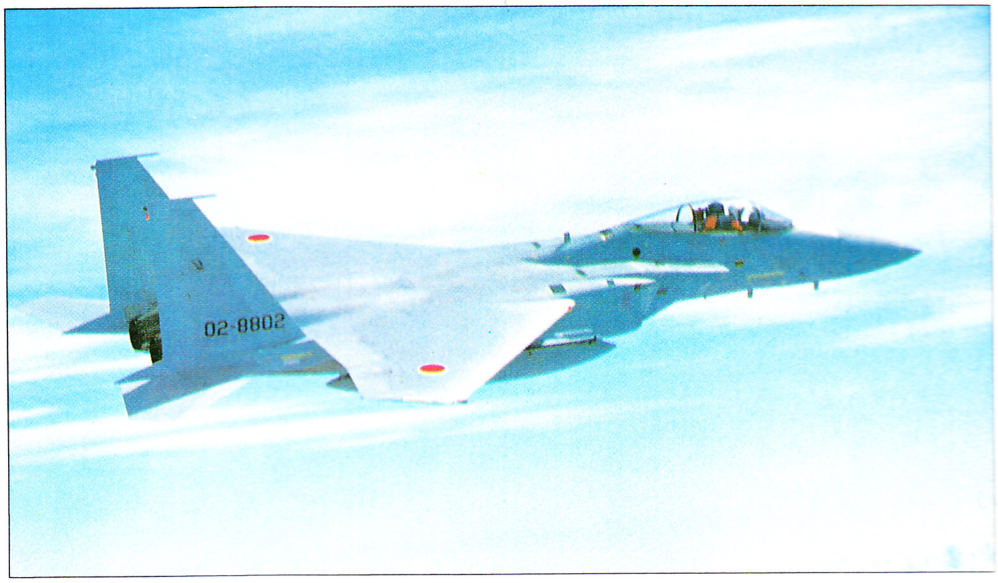
In 1951 the Americans approved the formation in Japan of the National Police Reserve, mainly for internal security duties, so allowing American occupational troops in Japan to be sent to South Korea. This new force was soon renamed the National Safety Force and was then merged with the Maritime Safety Force, and this in 1954 became the Japanese Self-Defense Forces. In the 1950s much of the equipment came from the USA, but in the 1960s the Japanese started to design and develop systems to meet their own specialized requirements and today most equipment is built in Japan. In the case of high-technology equipment such as aircraft (for example the McDonnell Douglas F-15 Eagle and the Lockheed P-3C Orion), this is licence-produced mainly from the USA.

The army

The Japanese Ground Self-Defense Force (JGSDF) has a strength of about 150,000 men and is organized into one armoured and 12 infantry divisions, plus five engineer, one signal, one airborne, two composite, one artillery and two air-defence brigades.

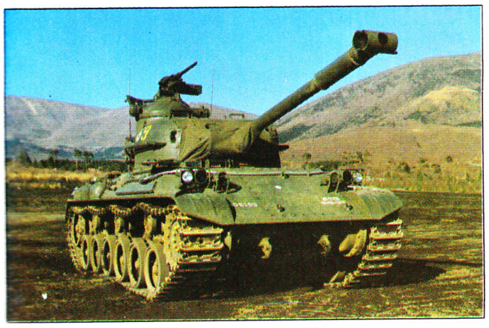
Over 850 tanks are in service, including the indigenously designed and built Type 61 with a 90-mm gun and the Type 74 with a 105-mm gun (this latter type will remain in production until the late 1980s). APCs include the older type SU-60 and about 150 of the more recent Type 73. Artillery includes 105-mm M101, 155-mm M114 and 203-mm M115 towed howitzers and a few 155-mm M59 'Long Tom' guns, all of which date from World War II. Self-propelled artillery includes 10 155-mm M44, 30 155-mm M52, 20 105-mm Type 74 (no longer in production) and over 50 155-mm Type 75 (currently in production) self-propelled howitzers. Japan is expected to undertake licensed production of the European 155-mm FH-70 and the American 203-mm M110A2 self-propelled howitzers. Also in service are some 50 Type 75 multiple rocket-launcher systems.

Anti-tank defence is provided by about 250 Type 60 self-propelled equipments armed with twin 106-mm recoilless rifles; Type 64, Type 75 and Hughes TOW ATGWs; the Swedish 84-mm Carl Gustav light anti-tank weapon (now being made under licence in Japan); and 57-mm, 75-mm and 106-mm (including Jeep-mounted) standard recoilless rifles.



A licence-built McDonnell Douglas F-15 Eagle of the Japanese Air Self-Defense Force. Mitsubishi is building 100 of these advanced aircraft to replace ageing Lockheed F-104J Starfighters in the interceptor role. They will fly alongside Japan's current complement of 140 McDonnell Douglas F-4EJ Phantoms.

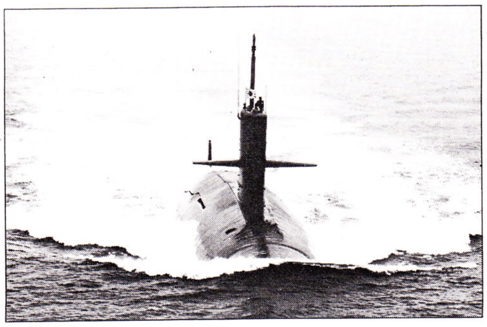
The Type 61 Main Battle Tank was the first post-war Japanese tank, and served from 1962 (560 produced). Main armament was a Japanese-developed 90-mm rifled gun. The Type 61 is now being steadily replaced by the Type 74.



Air defence of the JGSDF is provided by obsolete M42 40-mm and 12.7-mm self-propelled anti-aircraft guns (SPAAGs), improved HAWK and Redeye SAMs, Oerlikon twin 35-mm, 40-mm M1, 75-mm M51 and 90-mm M118 anti-aircraft guns. The Japanese-designed Tan SAM is expected to enter service in the near future, while the American General Dynamics Stinger man-portable SAM is to be made under licence as a replacement for the older Redeye. To replace the M42 40-mm SPAAG a new twin 35-mm system is currently being developed under the designation Type AW-X; production systems will use the Type 74 MBT chassis.

Japanese infantry weapons include the old American 0.45-in (11.43-mm) M3A1 sub-machine gun; the 7.62-mm (0.3-in) Type 64 rifle; 7.62-mm (0.3-in) Type 62 and Browning 0.5-in (12.7-mm) M2 HB machine-guns; the 60-mm M1, 81-mm M1, 81-mm Type 64 and 107-mm (4.2-in) M30 mortars. The 81-mm mortar is also mounted in the Type 60 APC under the designation Type SV 60 self-propelled mortar carrier, while the 107-mm mortar is mounted in a similar vehicle designated Type SX 60.

The JGSDF also has the Type 67 Model 30 rocket-launcher in service. This is fitted to the rear of a Hino (6×6) 4-tonne truck chassis, and carries two rockets in the ready-to-launch position. A second truck carries six reserve rockets, each with a range of 28,000 m (30,600 yards).

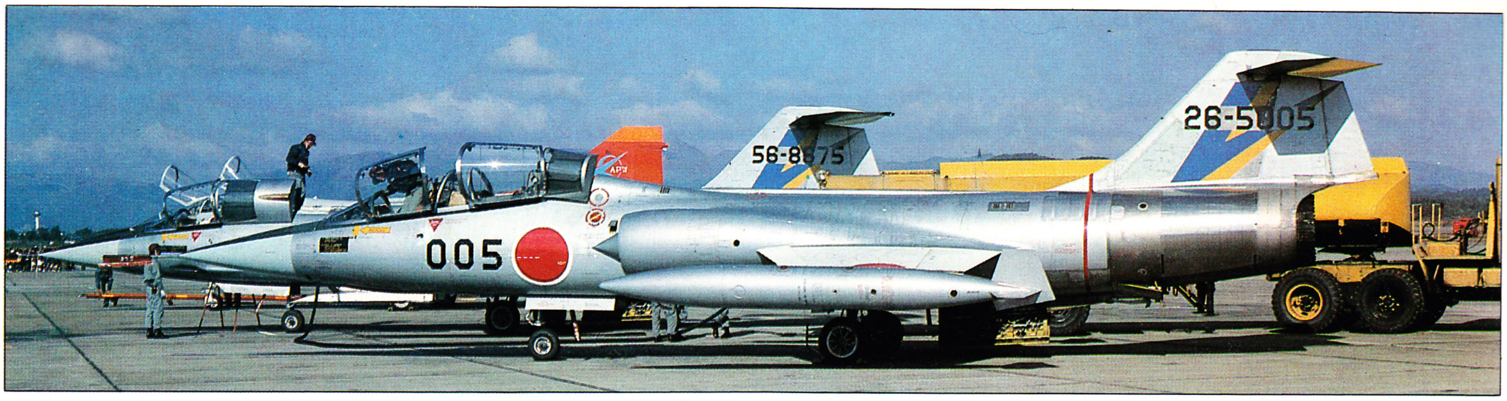


A 'Yuushio'-class patrol submarine of the Japanese Maritime Self-Defense Force. Japan operates 14 locally-built conventional submarines, with three further boats on order.

The JGSDF also operates almost 400 aircraft and helicopters. The former include the Mitsubishi LR-1, Fuji LM-1 and Cessna O-1 Bird Dog, which last was built in Japan by Fuji as the L-19. Helicopters include the Bell AH-1S HueyCobra (to be built under licence), 55 KV-107 (Boeing Vertol made under licence), some 160 UH-1B/UH-1H Iroquois utility helicopters, (now being produced under licence) declining numbers of the Hughes TH-55, a few Bell H-13s and some 150 of Hughes OH-6 Cayuse series which are produced for the military and for civil operators by Kawasaki.

The air force

The Japanese Air Self-Defense Force (JASDF) has a strength of 45,000 men and just over 300 combat aircraft organized into six combat air wings, one composite air division and one reconnaissance squadron, which operates 14 McDonnell Douglas RF-4E Phantoms. The three fighter/ground-attack squadrons are equipped with the Mitsubishi F-1, the trainer version of this being the T-2. The 11 air-defence squadrons are equipped with the F-4EJ built under licence in Japan until recently (six squadrons), Japanese-built Lockheed F-104J Starfighters (four squadrons), and the new McDonnell Douglas F-15J (one squad-



The Japanese Air Self-Defense Force operates the Lockheed F-104J single-seater in the interceptor role, and also the F-104DJ trainer. Both are assembled by Mitsubishi.

ron). There are also three transport squadrons which operate 30 Japanese-built Kawasaki C-1 and 10 NAMC YS-11 transport aircraft, one search-and-rescue wing with a variety of fixed-wing aircraft and helicopters, plus the usual trials, weather-reconnaissance and training units. New equipment on order includes four Lockheed C-130H Hercules transport aircraft, more F-1 fighters and T-2 trainers, Grumman E-2C Hawkeye airborne early-warning aircraft (which should prove a valuable asset in countering Soviet aircraft in the Far East) and additional F-15J fighters and F-15DJ trainers.

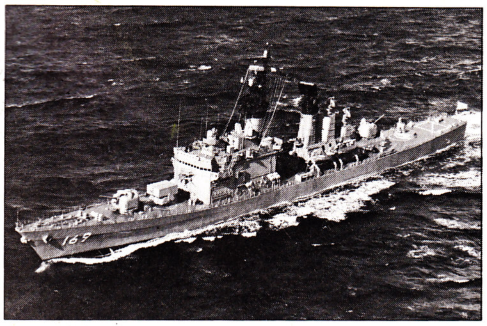
The navy

The Japanese Maritime Self-Defense Force (JMSDF) has a personnel strength of 45,000 including a very important naval air arm of some 14,000. Major surface ships include 33 destroyers, 16 frigates, five large patrol craft, over 10 coastal patrol craft, five fast attack craft, almost 40 mine-warfare vessels including three MCM support ships, over 40 amphibious warfare craft including six tank landing ships, and the usual support vessels. There are 14 conventional submarines in service and another three on order. Many of the destroyers and frigates are equipped with the American ASROC anti-submarine warfare system and carry a helicopter for ASW. Missiles fitted to the warships include the Sea Sparrow and Standard SAMs and the Harpoon surface-to-surface missile. The American General Dynamics Phalanx 20-mm close-in weapon system is being fitted to a number of surface craft to provide protection against anti-shipping missiles.

The naval air arm includes seven maritime reconnaissance squadrons with almost 68 Kawasaki P-2J Neptune and 21 Grumman S-2F-1 Tracker landplanes, and 19 Shin Meiwa PS-1 flying-boats. There are six ASW helicopter squadrons equipped with some 50 Mitsubishi-built SH-3 series helicopters, one mine-countermeasures squadron with seven Kawasaki-built Boeing Vertol KV-107 helicopters, plus transport, training, test and evaluation, and search-and-rescue flights equipped with a variety of fixed wing aircraft and helicopters.

There is no national service in Japan and service is voluntary. For some years the USA has been putting increasing pressure on Japan to increase spending on defence, which represents only 0.9 per cent of the gross national product. This compares with 6.1 per cent for the United States, 4.3 per cent for West Germany and 3 per cent for Australia (all based on 1981 figures). Japan spends less of her GNP on defence than any other country in NATO, Europe and the Far East. Many of the systems used by the Japanese armed forces are built in very small numbers and are therefore very expensive; and it is Japanese government policy to build equipment in Japan rather than to obtain it from abroad.

The anti-submarine destroyer Asakaze is unlike earlier Japanese destroyers in that she has an up-to-date missile-based air defence in addition to potent anti-submarine weaponry.



9071
海上自衛隊
71

The Shin Meiwa US-1 is an amphibious adaptation of the PS-1 flying-boat, configured for search and rescue duties with the JMSDF. Eight aircraft were ordered, serving with No. 71 SAR Sqn of the JMSDF.

Order of Battle

Ground Self-Defense Force

One armoured division
12 infantry divisions
One airborne brigade
Two composite brigades
Two air defence artillery brigades
One artillery brigade
Five engineer brigades
One signals brigade
Eight SAM groups
One helicopter wing (Kawasaki KV-107II)
24 squadrons of aircraft and helicopters (Hughes OH-6, Bell/Fuji UH-1B/H, Mitsubishi LR-1)

Air Self-Defense Force

Three FGA squadrons (Mitsubishi F-1)
11 interceptor squadrons (F-4EJ Phantom, F-104J Starfighter, F-15J Eagle)
One reconnaissance squadron (RF-4EJ Phantom)
Three transport squadrons (Kawasaki C-1A, NAMC YS-11C/E)
One search and rescue wing (Shin Meiwa US-1)
One air test wing
One weather group
Five training wings with 10 squadrons (Fuji T-1A, Mitsubishi T-2A, Fuji T-3 etc)
19 SAM squadrons

Maritime Self-Defense Force

49 destroyers and frigates
20 patrol craft include five large and five fast attack craft
40 mine warfare vessels
40 plus amphibious warfare craft, including six LSTs
14 submarines with three more on order
Seven MR squadrons with more than 100 aircraft (including P-2J Neptunes, S-2F-1 Trackers, Shin Meiwa flying-boats Lockheed P-3C Orions)
Six ASW helicopter squadrons with 50 SH-3s
One MCM helicopter squadron with seven KV-107s